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AUGUST 3, 1961

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A

Report on Airedale

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The BEAGLE Airedale is the new British, four seat, light executive aircraft and it will soon be in service.

On the 16th April an Airedale flew for the first time.

On the 24th May the Provisional Certificate of Airworthiness was received. Tests are now being completed for the issue by the Air Registration Board of Full Transport Category Certification—including tropical clearance. The first aircraft is completing its tests for the semi-aerobatic category, including spins.

By the 30th September ten Airedales will have been completed; production will then be at the rate of three a week.

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THE AEROPLANE and ASTRONAUTICS

VOLUME 101 NUMBER 2598 AUGUST 3, 1961

Participation Without Contribution?

July 28, 1961, may well become historic as the date on which the first step was taken toward the practical peaceful use of satellites in space. On that date in Washington a contract was signed under which the U.S. National Aeronautics and Space Administration is to launch four satellites for the American Telephone and Telegraph Company. The cost of each satellite including launching and tracking will be more than £2 million. At least two of the satellites are to be put into orbit during 1962 and there are hopes that all four will be launched. At first the experiments will not be ambitious. The signals are to be sent between a station in Maine and one in New Jersey.

The operation has an international flavour in that Britain, France and Germany are providing ground stations for experiments in conjunction with NASA in experiments with active and passive satellites. The satellites to be launched under the new contract are active. Passive satellites, in the form of large inflated spheres like balloons, have already been launched.

The American Telephone and Telegraph Company, a private business, are joint owners with the British G.P.O. of the transatlantic cable, so the question that is of special interest to people in the United Kingdom concerns the part that the Post Office is to play in the operation of the new satellites. At first sight it does not seem likely to be more than sending and receiving signals.

The question that does need to be raised is what attitude the British Government has adopted in this matter. The G.P.O. may have a half share in the transatlantic cable but it seems unlikely to have any share in any communications satellite in the near future. Does this mean, and we are hoping that the question will be raised in Parliament, that the Government is satisfied to rely for its international communications on satellites owned by a private company domiciled in another country? If, and this it seems is what President Kennedy desires, the operation of sending up and maintaining communications satellites is to become international, what contribution is the British Post Office planning to make? Participation, without contribution of technical effort, is not likely to give this country much of a standing.

A Problem None Can Neglect

A message from New York on Sunday last, reported in the *Daily Telegraph*, stated that five airliners with more than 500 passengers on board had had landing difficulties in New York, Los Angeles and San Juan (Puerto Rico) during the previous 24 hours. No one was hurt. One of the aircraft concerned was a DC-8, two were 707s. Another was an un-named jet and one a piston-engined DC-6. The first skidded, one 707 had its landing gear collapse, two other jets had hydraulic system failures. The DC-6 had to circle for three hours while the nose-wheel was persuaded to come down.

Against the recent record of landing accidents this information is not calculated to encourage those extra passengers needed to get the load factor back to the position that every operator of the big jets wishes to reach. It is not to be forgotten that of the 82 accidents or incidents occurring in 1960 and analysed in our issue of Jan. 13 last, 25 (30%) were during the approach and landing. This was not far off double the figure for take-off.

Some aspects of the problem were reviewed in our new feature OPtional Reading last week. It is clearly one which no operator can be seen to neglect.

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Matters of Moment

£400 Million Aero-engine Exports

A RECORD total of £44,499,462 in aero-engine exports during the first half of 1961 brings the grand total since the War, excluding royalty payments, to £400 million—or a little more than one-third of the value of all aviation exports during the 15 years.

Industry exports for January-June, 1961, were valued at £82,866,622, including, additionally to aero-engines and parts, £34,722,532 in aircraft and parts, and £3,644,628 in electrical equipment, aviation instruments and tyres. Heading the buying countries for aircraft and engines were Canada, the U.S.A., France and India; the Lebanon and Egypt were major buyers of aircraft and parts, and Italy and West Germany of aero-engines and parts. Dollar exports amounted to the equivalent of £35 million.

The total export values for the half-year were equivalent to more than half the record annual total of £156 million, recorded in 1959. The value of exports during the second quarter of 1961 was, at £41,145,481, the third highest to be recorded in any three-month period.

Vulcan—Skybolt Conversion

IN addition to Vulcan B.2 airframe modifications, to accommodate two Douglas Skybolt ALBMs, which are the responsibility of Avro, the task of specifying the alterations necessary to make the Vulcan's navigation and bombing equipment compatible with the American missiles guidance system has been given to Associated Electrical Industries, Ltd.

Being undertaken by the company's Electronic Apparatus Division, this work includes the development and manufacture of fully transistorized conversion equipment for linking the V-bomber's existing navigation system with that of Skybolt. It also covers the production of special test gear for the conversion unit and technical assistance during the proving trials of the weapons system.

The Skybolt guidance system—which is understood to be a development of the Northrop Nortronics Division Mk. 1 stellar-monitored inertial equipment—requires digital inputs and it is the function of the conversion unit to transform Vulcan analogue navigational information into the required digital form without loss of accuracy. Techniques used in the construction of the conversion unit will be consistent with those employed in Skybolt.

Vulcan airframe modifications include the addition of two underwing pylons and the installation of a special Skybolt pre-launch computer.

The R.Ae.C. to Move

AFTER 30 years at 119 Piccadilly, London, W.1, the Royal Aero Club is looking for new premises.

Negotiations are in hand with the Lansdowne Club in Fitzmaurice Place, just off Berkeley Square. If the negotiations are successful the Committee hopes to have more positive information for members in the early autumn.

Although the rent for the present site is not excessive (£2,000 p.a.) by today's standards, the R.Ae.C. revenues could not support a higher charge. By joining up with the Lansdowne, the two clubs would be able to share the overheads. The present Lansdowne premises are so large that it is felt that the Royal Aero Club could have completely separate accommodation.

Members of the Royal Aero Club, whether regular visiting town members, or those from the country or those from overseas, will bitterly regret transferring from such a pleasant and delightful spot. Some will undoubtedly find compensation in the thought that the going into operation of the new Hyde Park Corner underpass is bound to make the R.Ae.C. balconies very noisy, and the fumes from increased traffic are likely to prove increasingly unpleasant.

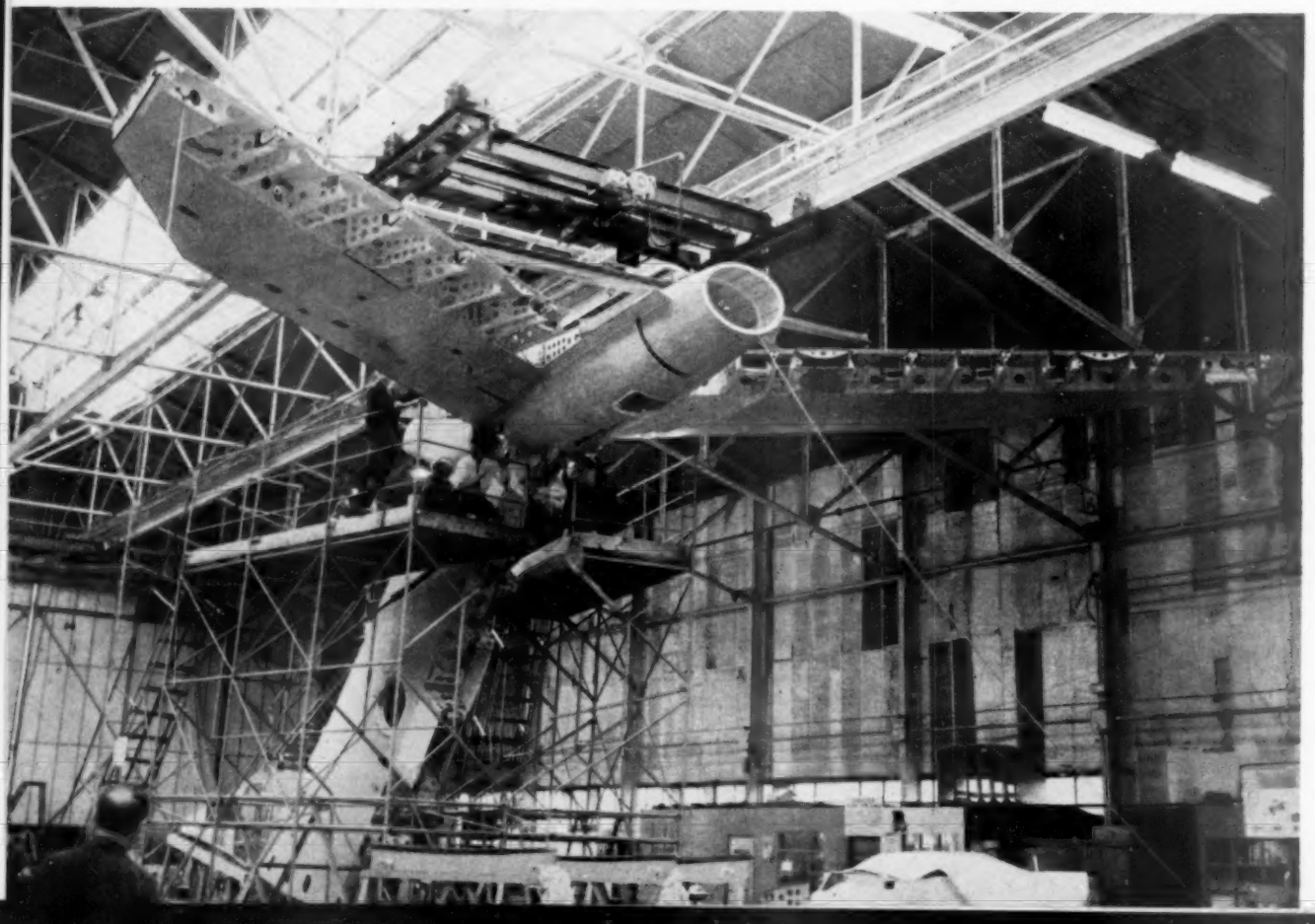
The change provides another outward indication of the altering circumstances of sporting aviation in this country.

Back to Aviation

IT was learnt during last week that Sir Miles Thomas, D.F.C., M.I.Mech.E., M.S.A.E., is to renew his once-close association with aeronautical affairs. He has accepted an invitation to join the board of the Dowty Group—but he will, of course, continue as chairman of Monsanto Chemicals.

To this new appointment, Sir Miles takes a great deal of

VC10 PROGRESS.—This recent photograph, taken at Vickers' Hurn, Bournemouth, plant, shows the mating of the tailplane and fin for the first production VC10.



GNAT ORDER.—As briefly recorded on page 138 of this issue another series of Gnat Trainers has been ordered for the R.A.F. from Folland Aircraft.

experience in aviation and commerce—to say nothing of drive and enthusiasm for the task in hand. No information has been forthcoming about any special duties which he may have as a Dowty Group director, but it can safely be assumed that he will work closely with Sir George Dowty, the Group's chairman, Mr. R. F. Hunt, the deputy chairman, and Mr. L. T. P. Banbury, its secretary, in helping to extend its contributions in the various industries it serves. This further strengthening of an already strong team may well foreshadow even wider aviation interests in the Dowty Group and expansion of its business through the World.

Air Matters in Parliament

Transport Command—Lessons of Kuwait

A DISCUSSION in the House of Commons of the present strength and future prospects of R.A.F. Transport Command was inaugurated by MR. F. W. MULLEY (Lab., Sheffield, Park) who asked the Secretary of State for Air on Jly. 19 to what extent the resources of Transport Command had been involved in the airlift to Kuwait, and invited him to make a statement.

MR. JULIAN AMERY said that some 70 R.A.F. Transport aircraft were used, and that this force, augmented by three Royal Rhodesian Air Force transport and 17 chartered civil aircraft, moved about 7,000 men and about 700 tons of stores to airfields in the Persian Gulf and Aden. He added that the speed and efficiency with which this operation was carried out resulted largely from recent intensive combined training of Army and Air Force in air movement of troops and equipment.

Mr. Mulley suggested that the demands of this operation high-lighted our lack of a long-range strategic freighter, and that, in fact, if Kuwait were less well placed in relation to a base we should have run into real difficulties. In reply Mr. Amery said that although he is certainly not satisfied with present strength, we managed within our resources, without detriment to other essential tasks, to do the job in hand.

MR. J. HALL (Cons., Wycombe) asked if it were not clear that Transport Command had been stretched to the limit, so much so that if another operation had been found necessary at the same time we should have found the utmost difficulty in meeting the demand. Would it not therefore be advisable, he asked, to hasten development of further Transport Command aircraft, especially the long-range strategic type?

Mr. Amery agreed to the latter, but felt it was hardly true to say that we had been extended to the utmost. For instance, we continued with the routine airlift of Ghanian and Nigerian forces to the Congo throughout the Kuwait operation, and within a week of the beginning of that operation we were carrying out another and distinct task, namely reinforcement of Kenya with elements of the 19th Brigade.

Mr. Mulley returned to his charge a week later, on Jly. 26, by asking the Secretary of State for Air when he expected to have strategic air freighters in service; and whether he would place orders for the Lockheed Hercules as soon as satisfactory arrangements were made for its manufacture here. Mr. Amery replied: "The Britannia already gives us some strategic freighting capability, and the Belfast is due in service in 1964. We have no plans to order the Hercules for this task."

MR. J. D. CRONIN (Lab., Loughborough) then asked the Minister what arrangements he is making to improve Transport Command's carrying capacity pending delivery of the Belfast in 1964. Mr. Amery said that in the interim delivery is expected of 56 Argosies and five Comet 4s now on order. He went on to explain that the Lockheed C-130, or Hercules, would not fulfil the rôle for which the Belfast is required, due to its inability to carry the equipment envisaged, not on the score of weight but on that of bulk. To Mr. Mulley's final question, as to whether the Minister was satisfied to wait three years after what was disclosed in the Kuwait operation, Mr. Amery replied that, unsatisfied on present showing as he had expressed himself to be, "there is no aircraft, apart from the Belfast, which between now and 1964 would carry the heavy and bulky items of equipment the Army and Air Force wish to be transported."

Tushino—We Are Not Dismayed

On Jly. 26, MR. J. GRIMMOND (Lib., Orkney and Zetland) asked the Secretary of State for Air what reconsideration was being given to the estimated life of Great Britain's V-bomber force and independent deterrent, in view of the indication provided by the recent Soviet air display at Tushino that Russian air defences now include Mach 2 fighters.

MR. AMERY replied that nothing seen at Tushino altered the official view that the V-force, with the successive improvements already planned in its offensive capability, will remain a valid deterrent for the rest of the decade.

Major Payn A.F.C.

HAROLD JAMES PAYN, A.F.C., R.A.F. (retd.), who died at his home in Walton-on-Thames on Jly. 22 at the age of 73, was an active figure in aviation before World War II.

Enlisting in the Royal Engineers motorcycle section in August, 1914, he transferred to the Royal Flying Corps in 1915 as an observer in No. 6 Squadron. In 1916 he was a pilot with No. 42 Squadron, subsequently serving with Nos. 29, 34 and 43, part of the time as a flying instructor, and attaining the rank of temporary Major, by which title he was usually known later in life.

After the Armistice he was posted as an acceptance pilot to A. and A.E.E., Martlesham Heath, and during this period was awarded the Air Force Cross for outstanding flying. In 1923 he joined Vickers as a technical assistant to R. K. Pierson and in fact undertook most of the testing of Vickers aircraft between the retirement of Capts. Broome and Cockerell as chief test pilots and the appointment of Flt. Lt. E. R. C. Scholefield to that position. He was able to bring a considerable knowledge of control and handling in the air to bear on design problems.

Later, when he had transferred to the Supermarine Works, on their acquisition by Vickers Aviation, he became a member of the design team of R. J. Mitchell and later of Joe Smith.

Mr. Beverley Shenstone, a former colleague of Major Payn in the Supermarine design team, writes:

"Because he was so much older than his flying pupils when he was doing his stint of instructing, Major Payn was nicknamed 'Daddy.' There are many who were or still are in the design office of Supermarine who will remember him well and how kindly he dealt with those younger than himself. He had a wide practical experience and imparted it quietly but with fervour. He was extremely well liked at Supermarine, right from the shop floor to the top.

"His colleagues were very sorry when he left aviation shortly before the Second World War. Since then he had lived through some difficult times but he was always courageous in adversity."

Business and Touring at Kidlington

AFTER last year's wash-out conditions for the first International Business and Touring Aircraft Competition, the weather made amends during the past week-end for the second event of this type, organized by the Royal Aero Club and the Business Aircraft Users' Association.

Despite the passage of a front immediately before the opening of the distance event on Friday, Jly. 28, conditions were just about perfect by the time the first aircraft took off from Oxford Airport, Kidlington, and remained so for the entire 626-st. mile course round southern England. On the following day, when the take-off and landing components of the contest were held, the only imperfect aspect was that the wind dropped from that forecast—which resulted in several of the more marginal competitors going through, rather than over, the barrier.

One, in fact, went underneath it, but none of those in the leading positions as a result of the distance event embarrassed themselves by losing all take-off points through such mishaps. Ian Forbes, the eventual winner, in an American-registered Piper Comanche 250, who had scored most points on Friday, went on to confirm his supremacy in no uncertain manner, although the second-placed entry—Ken Burvill in the Aero Commander—pulled up from fourth to that position by excellent flying and an excellent aeroplane.

Although important, the flying was far from being decisive in the final evaluation, and a large proportion of the points were awarded for such qualities as comfort, equipment, and baggage capacity. All the top-placed aircraft exhibited these characteristics in ample measure, in addition to good all-round performance, and the method of assessment in the competition seems to have been quite a reasonable one in facilitating the selection of the outstanding business and touring aeroplane.

As an international contest, the entrants could have been rather more numerous, although the aircraft taking part included types of American, British, Czechoslovakian, French, Italian and Swedish design and manufacture. Not surprisingly, only one of the competing types—Peter Masefield's Chipmunk—was 100% British, although he will undoubtedly change that state of affairs by the time of next year's IBATAC. As it was, the entry list was not quite so cosmopolitan as it sounds since, of the 20 aircraft to arrive on Thursday, 14 were American. A fifteenth which had been entered—Keegan's Aero Commander—was a non-starter through undercarriage trouble.

Entrants were divided into three classes, the first being for single-engine types with up to two seats and not exceeding 2,204 lb. all-up; second, single-engine with more seats and up to 12,500 lb. gross; and the third, multi-engined up to a similar weight. The overall winner could be from any class, on the maximum points gained, and there were also four placings in each individual class. Competition was most intense in Class II, there being five and four entrants respectively in I and III.

In a contest of this kind there is a great deal to be gained by a close study of the rules, as well as from the interpretation of them. In Class I, for example, the eventual winner was Flt. Lt. McDonald of the Cranfield Air Centre in a Cessna 172, which is basically a four-seater. By electing to declare it a two-seater, and using the other accommodation for baggage, he was able to do well in his class if not in overall classification.

In general, about half the total of points resulted from the distance event, which was a very long flight (626 miles) with the maximum possible load. Points were awarded on the formula $\frac{A \times Vb \times N}{10}$ where A was achieved a.m.p.g., Vb the block speed and N the number of seats or passenger payload at 180 lb. per seat, including baggage. Maximum marks on formula were 1,500, and it will be seen that careful study of cruise conditions was required for the best compromise between fuel consumption and speed to be achieved.

The course for this event started from Kidlington with a 123-st. mile leg to Seething, a disused airfield near Norwich. There was then almost a 180-deg. turn back to Rearsby; a slight change to Wolverhampton, 150 miles farther on from Seething; a 41-mile leg to Shobdon, near the Welsh border; and a long 148-mile track to Shoreham. From there it was 26 miles along the south coast to Beachy Head, and then 44 miles to Rochester. A further 43 miles brought contestants to Panshanger, and it was then 50 miles home to Kidlington.

All the turning points, except Beachy Head, were airfields (in fact their signal squares in most cases), which was just as well, since the aircraft had to dive right down for identification. It was not because of the proximity of the aeroplanes that the lighthouse keepers eventually retired inside their balcony, although most of the contestants went fairly close to make sure their numbers were read; the N.W. wind over the downs buffeted keepers and aircraft with utmost impartiality.

Wind was quite a factor in the round-the-houses event; somehow there managed to be a head wind or adverse beam wind all the way round except on the Shobdon-Shoreham leg. From the forecast value of 300/310 deg., 20-25 knots, all the way up to 10,000 ft., the wind veered towards the North, to become 350/010 at a similar strength during the mid-day period—which upset a number of calculations. Cloud base was about 4,000 ft., although this did not enter much into most people's planning, since it was necessary to come down quite often to deck level for turning-point identification. Time spent in climbing to more fuel-thrifty altitudes was therefore largely wasted.

It was permissible to land at Shoreham and Rearsby for refuelling, although, ideally, a non-stop circuit was desirable. Although many of the entrants could not have made it anyway without refuelling, the adverse winds brought others into unplanned stops, during which the timing for block speeds was naturally suspended. Fuel conservation techniques were therefore at a premium, and it is noteworthy that Ian Forbes in his Comanche used the well-tried Conrad system—of leaning out the mixture on one magneto until the engine ran rough—to get the best possible fuel/air ratio. He was one of the few contestants in Class I or II to get round non-stop.

As all tanks used had to be filled to capacity, and a maximum load carried, the contest gave an interesting glimpse into the load-carrying abilities of different types. With full tanks, for example, the five-seat Helio Courier carried only three persons, while the Aero Commander 560 found it possible to lift the equivalent of its maximum seven-seat capacity, in the form of passengers and ballast. Sandbags or similar weights, including odd pieces of concrete lying around Kidlington, were pressed into service to get the maximum payload, and the new Cessna 185 found it possible to lift four adults and 450 lb. of ballast, in addition to full fuel, for its maximum six-seat capacity. Passenger weight was a minimum of 160 lb. for each seat declared, plus 20 lb. of baggage.

Despite the heavy loads carried, the take-offs, at two-minute intervals, were uneventful. All contestants were away by 11.00

Over the tape in the take-off section of the International Business and Touring Aircraft Competition go, left to right, the first, second and third-placed aircraft in overall points: the Comanche 250, the Aero Commander and the Mooney Mk.21.

Photographs copyright "The Aeroplane and Astronautics"

hrs. on Friday morning on the long flight, for which up to eight hours was allowed. In fact, nobody took longer than seven hours overall, the last men home being Norman Jones in the ultra-light Condor, and Toss Murray in the little Cub. First arrival back was Bob Potgieter, who had flashed round in the Cessna 310 in time for lunch.

When the results of the distance event were computed, from the elapsed time, payload and amount of fuel used, plus up to 60 bonus marks for residual fuel (at one mark per minute's margin), Ian Forbes had taken the lead, with 1,082 points, in his Comanche 250, closely challenged by the Mooney Mk. 21, flown by G. C. Wilkinson, with 1,058 points. John Fricker, in the Cessna 185, was third, with 1,025 points, and Ken Burvill had gained exactly 1,000 in the Aero Commander. Burvill was therefore ahead in Class III, and Jimmy Hunter, in the Aircoupe, with 538 points, had taken the lead in Class I.

Fine weather, moderate winds and excellent visibility had made the distance event most enjoyable for pilots and crews, but Saturday's short take-offs and landings also provided a great deal of amusement for spectators. At the early morning briefing, winds of 8-12 knots from 290/315 deg. were forecast, and the grid and barriers were laid down, with 100-ft. balloon markers on each side, along the 31 grass strip.

The take-off and landing tests are not absolute criteria of performance since, for the former part, pilots have to estimate the distance to clear the 10-ft. barrier, and declare it well beforehand. Providing they clear the barrier no matter with what margin, points are awarded on the declared distance Hitting or going beneath the tape loses all points, so that it obviously pays not to be too optimistic.

Fourth in the general classification and third in Class II was the new Cessna 185 Skywagon, which was flown by John Fricker.

Unfortunately for half-dozen of the contestants, the forecast winds had not materialized by the time the first aircraft taxied on to the grid. It was never more than six knots—or half the forecast figure—during the morning, and occasionally dropped to zero. The aircraft were flown solo, although with full tanks, and even the most experienced hands at this particular game were caught out by those few vital knots that were missing.

It was evident that the leaders in the distance event had played it very safe from the way they soared over the barrier, and, among the bigger aeroplanes, the Aero Commander and the Piaggio P.166 (after slight trouble starting one engine), in the hands of Ray Young, were particularly impressive. Best-

Peter Clifford and passengers sit in the sun in the Meta-Sokol at Kidlington while waiting their turn to take-off in the distance event after the Cessna 175, which Best-Devereux is taxi-ing out.

Devereux, in the Cessna 175, judged it to a nicety, and Jordan in the Tri-Pacer also did very well with the shortest achieved figure of 115 yd.

Great things hung on the take-off performances of the Helio Courier and the little Piper Cub, since there was a £100 wager between Mr. Kenneth McAlpine and Tim Vigors, respectively the Helio and Piper dealers, on which could become airborne in the shortest distance. Alas for their chances in the main contest, both were defeated by the lack of wind; the Courier went through the tape at its declared 80 yd., and the Cub went right underneath it from 70 yd. The wager was subsequently fought out after lunch in a brisker wind by Capt. "Topsy" Turner and Toss Murray, who advanced in 10 yd. steps during successive take-offs, until the Courier could not follow the Cub over the tape from 70 yd.

Pipers were therefore the winners of this side event—Wg. Cdr. Murray's technique being quite something to watch. He opens up to full power on the brakes, and pushes the stick forward until the tail comes up to the flight position. The sequence is then: brakes off, brief level run to accelerate, dump full flap, heave almost full aft stick, rotate the Cub on its tailwheel to about 35 degrees and helicopt away. A triumph for low wing- and high power-loadings, the Courier not being able to take advantage of its more sophisticated aerodynamics in so short a distance because of the sheer length of its fuselage. In a test to the standard 50 ft. it might be a different story.

When the points for all the additional items were added to those for the flying events, Ian Forbes retained his overall lead, and of course also gained first place in Class II. He was awarded the R.Ae.C. Diamond Jubilee Trophy and the McAlpine Cup, together with prize money of £250. Second overall, Ken Burvill of Field Aircraft Services, also won Class III with the Aero Commander, and gained the Beagle Cup plus £200. In third place overall was G. C. Wilkinson in R. K. Dundas' Mooney Mk. 21, entered by Iliffe Transport Publications, while fourth was John Fricker in Airwork Services' Cessna 185 Skywagon. First place in Class I was gained by another Cessna, the 172, flown by Flt. Lt. A. J. McDonald and entered by W. H. and J. Rogers, Ltd.—J.E.F.

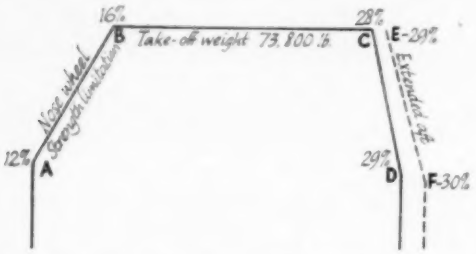
BUSINESS AND AIR TOURING COMPETITION : POINTS BREAK-DOWN

Aircraft	Pilot	Distance event	Take-off	T.o. distance	Landing	Landing distance	Comfort	Equip-ment	Baggage	Total	Class place	Overall place
Class I				yd.		yd.						
Rollasen Condor	N. H. Jones	361	155	290	216	168	135	100	77	1044	5	19
Piper Colt	C. A. K. Scott	390	0	—	225	151	103	149	188	1055	4	18
Chipmunk	M. Lambert	477	120	360	184	233	76	156	77	1090	3	17
Piper PA-18 Cub 150	T. C. Murray	386	0	(70)	251	99	89	96	86	908	6	20
Aircoupe	J. W. Hunter	538	175	250	156	289	139	180	53	1241	2	16
Cessna 172	A. J. McDonald	512	205	190	215	170	160	157	200	1449	1	11
Class II												
Bellanca Cruisair	W. R. Flockhart	939	190	220	165	271	132	120	31	1577	6	8
Piper Tri-Pacer	W. H. Jordan	662	243	115	210	181	144	240	95	1594	5	7
Cessna 175	H. Best-Devereux	864	230	140	218	165	160	166	66	1704	4	5
Meta-Sokol	P. S. Clifford	751	0	(140)	183	234	135	127	101	1297	9	14
Comanche 250	I. A. Forbes	1082	175	250	177	247	169	210	110	1923	1	1
Mooney Mk. 21	G. C. Wilkinson	1058	175	250	162	276	164	182	55	1796	2	3
Cessna 185	J. E. Fricker	1025	233	135	171	259	144	152	38	1763	3	4
Helio Courier	C. W. Turner	657	0	(80)	250	101	138	130	191	1366	8	12
Jodel Ambassador	C. Francis	818	175	250	239	123	135	104	58	1529	7	9
Saab Safir	J. Hennessy	667	125	350	163	274	130	164	46	1295	10	15
Class III												
Aero Commander	K. I. Burvill	1000	155	290	151	299	161	272	46	1835	1	2
Piper Aztec	T. Vigors	824	0	(180)	188	225	154	261	65	1492	3	10
Cessna 310	R. Potgieter	657	0	(220)	159	282	161	251	135	1363	4	13
Piaggio P.166	R. J. Young	678	170	260	173	255	151	273	200	1645	2	6

Air Transport

Progress with the Carvair

IN four weeks from its first flight on Jne. 21, the first Aviation Traders Carvair (DC-4 conversion) completed 45 hr. 45 min. on 25 flights. It then underwent its first check 1, and has now resumed the trials which are expected to occupy another 100 hr. or so to obtain a full C. of A. Last week-end, a series of flights was being made with strain gauges on the propellers, and the general handling trials are now being continued.



The weight and C.G. envelope for the Carvair. The Aviation Traders' test crew have flown at points A to F, and handling is almost complete for A and B; the A.R.B. crews have also flown the aircraft at A and B.

The first series of trials has included flights at Filton to establish position error corrections, and the weight/centre of gravity envelope has been provisionally determined. Check flights have been made at each corner of the envelope, including a number at extended aft c.g. At forward c.g., the handling trials are 95% complete, and the A.R.B. has flown the aircraft at the maximum forward c.g. for its landing weight and take-off weight.

In all the flying so far, which has covered the full range of speeds from the VDF (demonstrated diving speed) of 276 m.p.h. I.A.S. down to the VMCA (the precise value of which has still to be finally determined), there has been no evidence of aerodynamic buffeting from the new nose. In the opinion of the test pilot, Don Cartlidge, it can now be said "with reasonable certainty" that the design configuration, including the extended fin and rudder, is right.

Runway performance observed to date seems good, with the approach path a little steeper than that of the DC-4, and landing distances possibly a little shorter because DC-6 type brakes are fitted. Cross winds of 16 knots have been encountered and a full-weight take-off has been made at I.S.A. +19° C. surface temperature.

If the certification programme continues at its present rate of progress, the Carvair should be flying on Channel Air Bridge routes later in the autumn, and may be joined by the second aircraft before Christmas. Three DC-4s have recently been purchased from Resort Airlines for conversion and are being stripped at Stansted Airport. The second of the new nose assemblies is in the mating jig and the third is in the assembly jig.

Footnote. The Channel Air Bridge application for a vehicle ferry service to Basle and Geneva, using the Carvair, will be heard by the A.T.L.B. next Tuesday, Aug. 8.

European Routes Case Ends

AS this page went to press, the Air Transport Licensing Board was listening to closing speeches by applicants and opposers in the European route rights case. The final stages of this first part of Public Hearing No. 21 continued along the lines already familiar, with individual applicants making their case for particular routes and their opponents indicating why the licences should not be granted.

The hearing had occupied 14½ full days up to and including last Friday, Jly. 28, when the final speeches were being made by Mr. Gerald Gardiner, Q.C. for B.U.A., Mr. Ashton Hill for Cunard Eagle, Mr. H. E. Marking for B.E.A., and others. In this time, the applications for 60 routes between the U.K. and destinations in Europe have been considered.

During the final summings-up in the European route hearings, Mr. Marking said that the Corporation's estimation was that it would lose £7,100,000 in 1965-66 if all the applications to other airlines were granted. Replying to a question from the board, he said that the expected 1965-66 passenger revenue on all the international routes covered by the applications would be £30,800,000. B.E.A. estimated that the granting of all the applications would divert 1965-66 revenue from the Corporation in the following proportions: British United, £3,100,000; Cunard Eagle, £2,100,000; Tradair, £1,300,000; Silver City, £500,000; and East Anglian, £100,000.

For British United, Mr. Gardiner said that it would not be an exaggeration to say that the very existence of the independents depended on their applications; that B.E.A. would not be broken or prevented from expansion by the granting of other licences; and that no harm would be done to the Corporation except that "they would not get 100% of the increase expected in air traffic."

The A.T.L.B. was to proceed immediately, on the first three days this week, with the second group of 11 applications (still as part of Hearing No. 21) for domestic routes. Cunard Eagle is the applicant for seven of the eleven routes, with Starways and Overseas Aviation applying for two each.

CONVAIR PAIR.—Taken during test-flight operations over Catalina Island, near San Diego, this photograph shows the "speed capsules" and other features of the developed 990, which is now due to enter airline service in December. The certificated maximum landing weight of the 990 has been increased to 202,000 lb. and the permissible take-off weight of the domestic version has been raised to 244,200 lb.—the same as that for the Coronado, the intercontinental variant.

B.O.A.C. Associates Lose £2 Million

Points from the Corporation's Report and Accounts for 1960-61

ONCE again, the most depressing feature of B.O.A.C.'s 1960-61 trading results is the loss on the investments in its associated companies. The Corporation's share in the deficits amounted to £2,071,354, or £959,746 more than in the previous financial year. The heaviest losses were returned by British West Indian Airways (B.O.A.C.'s share, £645,243), Mideast Aircraft Service Company (£418,152) and Bahamas Airways (£405,728).

The B.O.A.C. report, published last week, explains that the Corporation is "deeply concerned" by these adverse results, has made an "exhaustive examination" and is taking "vigorous steps" to remedy the situation, but that financial improvements will inevitably, because of political and other considerations, "require patience and time."

The Corporation's own results were not too unsatisfactory, with an operating surplus of £4,264,219 (or a margin of 5.1% on expenditure) and a deficit of £472,926, by comparison with last year's surplus of £277,813, after payment of interest on capital (£4,737,145). The year's revenue, at more than £88 million, showed an increase of 25% on that of the previous year.

The combined net deficit (as seen in the table on this page) was £2,544,280 and this, after a profit adjustment on the redemption of B.O.A. stock, increases the accumulated deficit to £14,850,327—of which £10,011,278 is attributable to associated company deficits and to continuing interest payments on the lost capital involved.

So far as B.O.A.C.'s own accounts are concerned, the relatively poor results are put down to the delay (for airworthiness reasons) in the introduction of the 707s (which is estimated to have cost about £2 million in revenue) and to the business recession in the U.S.A. It is probable, too, that the Algerian crisis in France caused prospective U.S. travellers to Europe to think again at a time when they might have been booking for their holidays.

In fact, the Corporation does not appear, from the published figures, to have done too badly during a period in which nearly all long-haul carriers had provided excess capacity in relation to traffic. B.O.A.C.'s total scheduled ton-mile capacity was increased by 31.8%, yet the overall weight load factor dropped by no more than 2.1 points to 55.5%. The offered seat miles increased by 34.7% and the sold seat miles increased by 29.3%. About 80% of the additional passenger-mile capacity and about 75% of the total additional ton-mile capacity were sold.

Production costs were reduced from 34.0d. per capacity ton mile in 1959-60 to 30.3d., and engineering costs from 7.5d. to 6.1d. The aim is to reduce this year's figure to 5.25d. per capacity ton mile—which, the report says, "we believe compares favourably with the best of our competitors." Output per employee was 33,454 capacity ton miles; the previous year's figure was 25,094.

Significant, in this era of excess airline capacity and of unsaleable fleets, is the fact that B.O.A.C.'s charter revenue increased by 167% to £4,712,886. Most of this revenue was earned with propeller-driven aircraft—so there is obviously no shortage of traffic (even for "obsolete" aircraft) when the price is right.

The Associated Companies

Because of the government and other interests involved B.O.A.C. is not prepared, at present, to say much about its plans to rationalize the operations of associated companies and to modify the arrangements with air lines in newly independent countries which may wish to operate uneconomic "prestige" services. However, the annual report (which is, this year, very much more detailed than in previous years) clarifies, in a 12-page section, the reasons for certain of the losses.

For instance, B.O.A.C. found it necessary to re-purchase the 80% shareholding in Bahamas Airways which had been sold to Skyways in April, 1959. During 1960-61 there was, because of the losses being sustained, a probability that operations might be suspended and the Corporation could not afford to lose the feeder-line value of the airline, or the operating licences concerned. In buying back its shareholding B.O.A.C. also "bought" its share of the annual losses. There have been improvements in this year's trading.

Although it is not explained in the report, Mideast Aircraft Service Co. (in which B.O.A.C. has a 92% shareholding) took over, at the beginning of the year, a new engineering base at Beirut which had been planned many years before. At least for the initial volume of work this base is advanced in terms both of size and equipment and a heavy loss was incurred in its operation. The report explains that arrangements were made during the year for Middle East Airlines to take over the company's activities and for its property to be sold or leased to M.E.A.

Cargo—and the Future

A drive for cargo business, and the introduction of all-cargo North Atlantic services with DC-7Fs, produced a 25.5% increase in revenue and a 16.1% increase in ton miles sold. Questions and answers at last week's Press conference showed that B.O.A.C. intends to build up its cargo business with converted aircraft before considering the purchase of specialized all-freight aircraft. The DC-7F, which can just about pay its way at present rates on a 75% load factor, may be supplemented, or supplanted, later by converted Britannias which will offer better economics.

Speaking on the laboured question of supersonic transport plans, the chairman, Sir Matthew Slattery, made it clear, once again, that neither B.O.A.C. nor the majority of the airlines wanted to introduce the SST—or not, at least, until about the middle 1970s—but that competition might well force the pace. An M=2 aircraft could be in service by 1969-70 and would probably have a four-year time lead on the M=3 aircraft. If Britain is to enter the M=2 market then a decision should be made in the next 2-3 months. It would not be worth while to introduce an M=2 airliner unless there was a prospect of at least four years' lead on the M=3 vehicle.

FINANCIAL SUMMARY

		1960–61	1959–60	% change
B.O.A.C. Result				
Revenue	£	88,032,956	70,483,130	+ 24.9
Expenditure	£	83,768,737	66,182,557	+ 26.6
Operating surplus	£	4,264,219	4,300,573	− 0.8
Interest on capital	£	4,737,145	4,022,760	+ 17.8
Deficit	£	472,926	—	—
Surplus	£	—	277,813	—
Associated and subsidiary Companies Result				
Operating loss appropriate to B.O.A.C. shareholdings	£	1,539,729	639,188	+140.9
Interest on capital	£	531,625	472,420	+ 12.5
Deficit	£	2,071,354	1,111,608	+110.5
Combined Result				
Deficit	£	2,544,280	833,795	
Adjustments relating to prior years	£	560,413	277,143	
Profit on redemption of B.O.A. stock	£	383,584	269,191	
Net increase in accumulated deficit	£	1,600,283	287,461	

TRAFFIC STATISTICS

B.O.A.C. scheduled services				
Capacity ton miles offered		577,439,734	438,182,504	+ 31.8
Load ton miles flown:				
(a) passengers		240,898,180	188,216,082	+ 28.0
(b) excess baggage		3,024,633	2,521,166	+ 20.0
(c) mail		29,488,357	24,089,834	+ 22.4
(d) diplomatic bags		336,354	361,089	− 6.9
(e) freight		43,448,805	37,424,472	+ 16.1
Total		317,196,329	252,612,593	+ 25.6
Overall load factor	%	55.5	57.6	− 3.6
Seat miles offered		4,181,172,745	3,102,955,074	+ 34.7
Passenger miles flown		2,462,687,562	1,904,666,534	+ 29.3
Passenger load factor	%	59.6	61.4	− 2.9
All B.O.A.C. operations				
Passengers carried		887,057	626,072	+ 41.7
Freight carried (tons)		12,921	10,302	+ 25.4
Mail carried (tons)		5,548	4,562	+ 21.6
Aircraft miles flown		64,948,897	51,356,393	+ 26.5
Aircraft hours flown		194,524	166,595	+ 16.8

Traffic statistics relate to B.O.A.C.'s operations only. In reports of previous years certain statistics of capacities and loads have been quoted on an "after pooling" basis.

Choosing London's Next Heliport

IN a 105-foolscap-page report* issued last week the features of nine possible London helicopter (or VTOL) sites are discussed and illustrated in detail. All the sites have drawbacks, but three have been chosen as being the "most promising."

These (as reported in our issue of Mar. 3, this year, p. 227, and shown in the plan below) are at Nine Elms (one of two sites considered in the area), Cannon Street Station and St. Katharine Docks. Here are summaries of the committee's opinions about, and plans for, these three sites:

Nine Elms (Site B).—This could provide a 13-acre platform over the North Goods Depot, spanning Nine Elms Lane, and over an area beside the river. To allow the goods depot to continue in full use the platform would have to be 50 ft. high. This would seriously affect adjoining properties east and west of the site. Although the goods depot would take up much of the space below the flight deck, sufficient space for terminal facilities would be available on the site. The site has a wide range of unobstructed approach and take-off sectors. The pads most in use would be set back from the river and the main impact of noise would fall on industrial and railway activity and less on the residential areas on the north bank. Landings and take-offs could be confined to paths over industrial areas on the river without much reducing the very high usability of the site.

Cannon Street Station.—The available area of the station roof would be about three acres, which by itself could cater for isolated movements by single-engined and small multi-engined helicopters, but would be inadequate for regular and frequent services. The addition of a platform extending 200-250 ft. along the eastern side of the station would provide a flight deck of about 5½ acres in all at a height of 54 ft. This could later be expanded farther east beside the river to give a total of seven acres for pads and apron. More than enough space could be provided for passenger handling, car parks, etc., even at the smaller site. The site is within reasonable reach of the West End. North of the site is an area of high density office development, but, in contrast, the area to the south is almost entirely composed of riverside or industrial activity. All the site's approach and take-off sectors pass over the river or the industrial area on the south bank and clear of the office areas of the City, so that the operational usability of the site would be high while causing the least disturbance.

St. Katharine Docks.—To overcome the main obstructions of cranes, warehouses and the towers of Tower Bridge, a heliport platform would have to be at least 48 ft. high. Even then a number of cranes would have to be reduced in height to give the site satisfactory approaches over the river. By demolishing the blocks of flats and incorporating the existing warehouse activity below the heliport structure, a platform would be built over a ground area of about nine acres. More than enough space would be available for terminal facilities beneath the flight deck, and the remainder could be used for warehousing. Traffic from the West End would have to travel a considerable distance and go through the narrow and frequently congested streets of the City to reach the site. The activity in the neighbourhood is mainly warehousing, but some residential areas and the precincts of the Tower of London are nearby. With the majority of approaches and take-offs confined to the river and industrial areas the site would still have a high standard of usability for multi-engined helicopters.

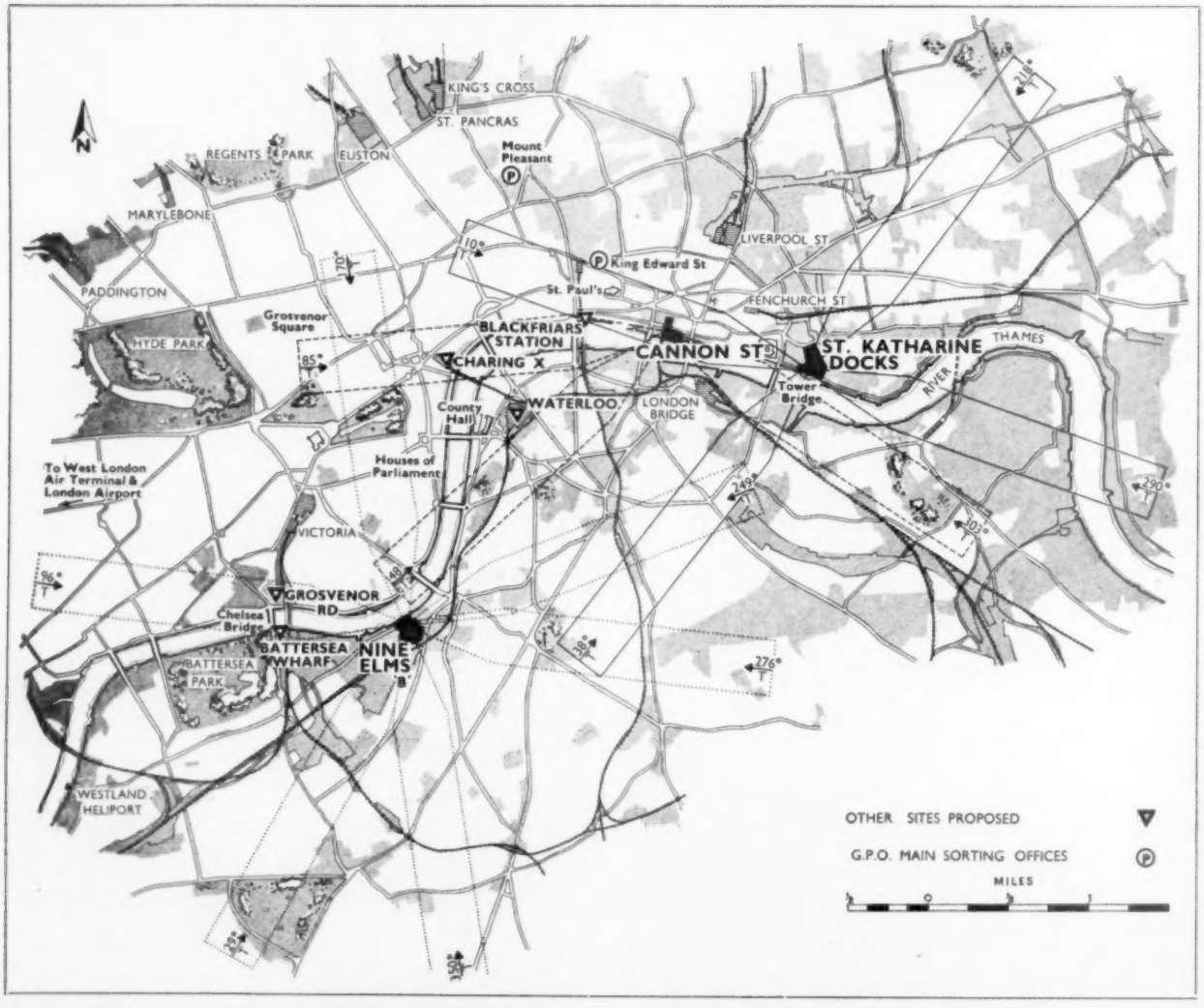
Other sites examined in detail are at Battersea Wharf; Grosvenor Road, Westminster; Nine Elms; Waterloo Station; Charing Cross Station; and Blackfriars Station. All of these pose planning, access, routeing, or amenity interference problems which put them out of the running.

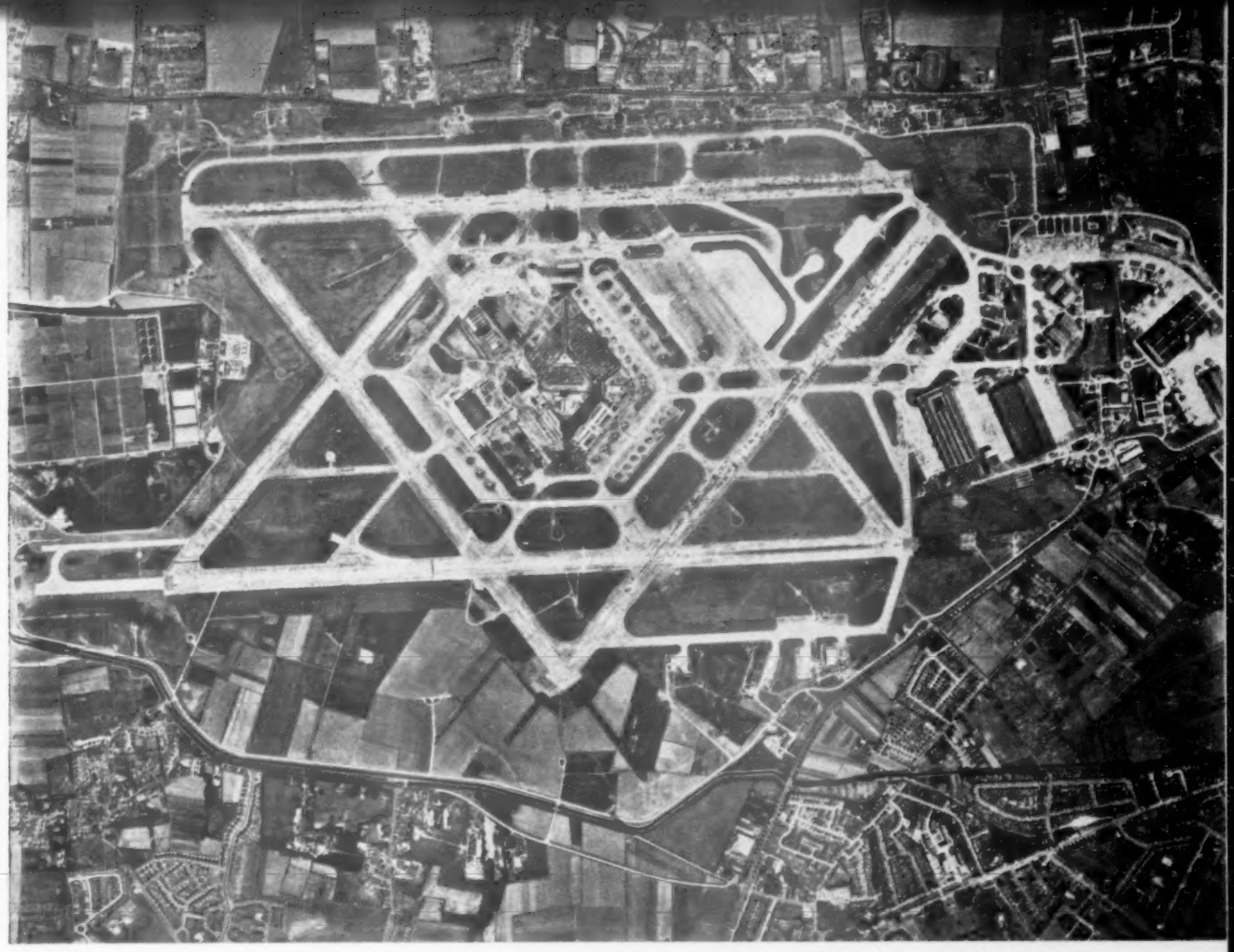
The report assumes that regular helicopter services at reasonable fares will be practicable in and after 1965—when, in any case, planning permission for the temporary Westland heliport at Battersea is due to expire.

As a basis for the planning of the first permanent heliport, it is assumed that the total traffic will amount to 20-25 aircraft movements an hour and 1½ million passengers a year by 1975. For handling this number of movements and the provision

(*Continued on page 126*)

* "Report of the Committee on the Planning of Helicopter Stations in the London Area"; H.M.S.O., 7s.

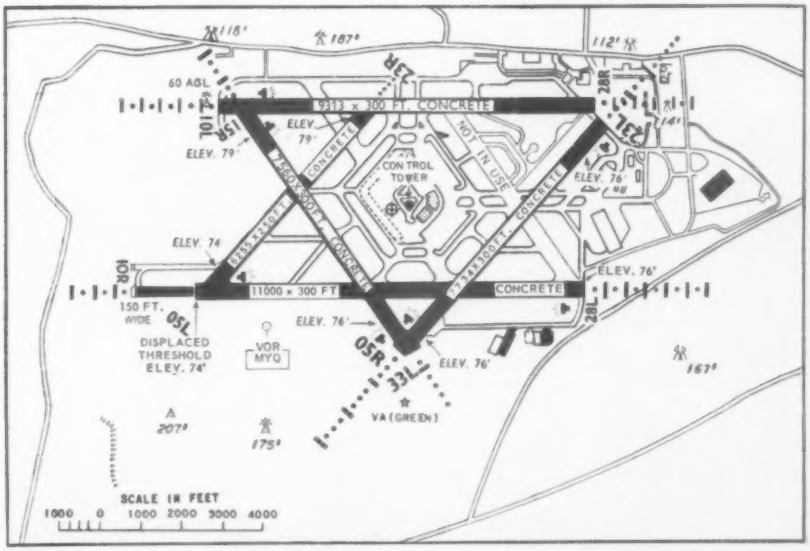




Photograph by courtesy of Fairey Air Surveys, Ltd.

Plan View of a Problem

This magnificent "vertical" of Heathrow shows graphically the very real difficulties posed by an "island" terminal site and the way in which the airport's original runway system has had to be changed.



With the aid of the International Aeradio landing chart on the left many interesting features of London (Heathrow) Airport can be picked out even in this reproduced version of a pin-sharp original. Note the long-haul building on the south-west side of the central area; the new extension at the western end of runway 28L/10R; and the fact that all eight aircraft parked on the north aprons are turbojets. The picture, which is orientated approximately with north at the top of the page, shows also how the "island" is tending to become a "peninsula" joined to the maintenance area "mainland" on the east side of the airport.

Air Transport . . . .

Airport Costs and Revenues

THE report on London's airports, summarized in last week's issue (p. 97), goes into some useful detail in explaining the reasons why it had been difficult to plan the means of improving the overall commercial results and in discussing the complicated question of comparative landing fees and associated charges.

Although the overall control of the Ministry's 24 airports has remained essentially unchanged during the past 15 years, there have been recent modifications to the system as this has been applied to London's airports. In 1957 a general manager was appointed with the specific task of looking after the commercial affairs of this group of airports. But the absence of adequate costing machinery and readily available data has been, the report considers, a "serious weakness" in the system.

The accounts, compiled mainly from information supplied by the individual airports, had always been maintained at headquarters, where *ad hoc* computations were occasionally used to supplement the material provided in the annual trading accounts. The defect in the system had been that neither headquarters nor the general manager have had readily available current information on the costs and income related to individual services.

Since Apl. 1 this year the system has been decentralized by transferring the records to the airports, and improved by the inclusion of more sophisticated cost and income budgeting and cost accounting. "It is unfortunate," the report comments, "that such a conspicuous defect in the management system was not appreciated at an earlier stage."

In 1955 it was assumed that future increases in traffic at London's airports would automatically cause the financial situation to improve, since revenue would, it was thought, increase without any comparable rise in operating costs. In fact, as the first table below shows, costs and revenue have risen by approximately the same amount—though the percentage increase in revenue has been much higher than that of costs. The two succeeding tables of unit costs show that no appreciable economies have accompanied the considerable increases in traffic.

	1955-56	1959-60	Increase	% Increase
Costs	£5,289,417	£8,328,602	£3,039,185	57
Revenue	£2,485,383	£5,589,900	£3,104,517	125

Year	Number of Passengers	Increase	Cost per Passenger	Reduction in cost
			£ s. d.	
1955	2,868,000	—	1 16 11	—
1959	4,600,000	60%	1 16 5	1%

Year	Total aircraft tonnage	Increase	Cost per ton	Reduction in cost
			£ s. d.	
1955	3,024,000	—	1 15 0	—
1959	5,005,000	66%	1 13 6	4%

The report deals with the problem of landing fees and associated charges in a comprehensive and objective manner. Recommendations are made for a reduction in the 100% surcharge on intercontinental flights, and for the introduction at Heathrow of a more flexible charging policy which would provide operators with a positive inducement to use the airport in off-peak periods and thus spread the load and permit more economic staffing arrangements. It is proposed that the differential should take the form of a rebate to the airlines which achieve a sufficient number of annual scheduled off-peak movements to make the scheme worth while.

Notwithstanding the protests about the recent increases in landing fees and the difficulty of making adequate comparisons, the committee came to the conclusion that the costs to operators using London's airports "are not unreasonably high"—or not, at least, in relation to the Minister's policy that the airports should be run, taking all costs into consideration, at a genuine profit.

A sub-committee attempted to discover the real relationship between the total charges incurred by operators using U.K. and other World airports—and, not unexpectedly, ran into considerable problems. Not only was a straight comparison of landing fees found to be "worthless," but overall comparisons of charges were found to be "hazardous" because of the wide variation in the principles underlying the charging policies in many countries. Several airports, for instance, charge undisclosed fuel levies and only in the cases of Paris (approximately ½d. per gallon) and Copenhagen (approximately 1d. per gallon) was it possible to estimate the effect of these levies.

A useful comparison is made of the total costs to B.O.A.C. of operating a 707 at 311,000 lb. all-up weight and carrying 78 passengers from Heathrow and Idlewild, New York. The passenger service charge is included in the Heathrow total—though this is hardly a cost to the airline since the passenger pays it and the airline (at present) actually takes 7½% by way of advance-collection compensation. Incidentally, the committee recommends that this charge should be levied on *all* departing passengers and not just on those going abroad, and that the charge should be reduced accordingly.

	Idlewild	Heathrow
	£	£
Landing fee	39	243
Passenger service charge	—	30
Passenger ramp and apron charge ..	4	—
Incinerator service	0.12	—
Porter service	21	—
Inspection space charge	48	—
General terminal charge	3	—
Air navigation facilities	2	—
Terminal facilities	62	45
Apron services	76	43
Fuel burnt while waiting for clearance	14	—
Totals	£269.12	£361

The report suggests that part, at least, of the dissatisfaction of operators with London's charges "is based on the fact that, in paying a flat rate, they do not know what they are paying for."

Heliport Sites . . . .

(*Continued from page 124*)

of working stands a level area of approximately eight acres will be required, with an additional four acres for terminal building and car parks—which will normally be provided at a lower level. For A.T.C. reasons no increase in landing area would improve capacity much beyond the 25-per-hour figure.

The report describes the ideal London heliport as one which is not much more than a quarter of an hour from Grosvenor Square (the "centre of gravity" of passenger sources), preferably between the West End and the City, and near to a G.P.O. sorting office; which has good public transport and road connections; which has adequate unobstructed approaches for operations in all weathers; which is beside the river so that it can be used by single-engined helicopters; which, for fixed-wing air traffic safety reasons, is not farther west than Battersea Park; and which does not unreasonably interfere with normal life and work. The chosen sites offer the best compromises.

Measurements with various types of helicopter indicate that the noise in level flight at 1,000 ft. will be no greater than traffic noises in a busy street, but will be high within a radius of half a mile. Although the report stresses the point that these must be "interpreted with care," curves in an appendix show that the twin-tandem-rotor helicopter involves much the smallest area in noise levels higher than 85 phons ("noisy to unpleasantly noisy"). On the subject of noise, the report comments: "Provided the site is carefully chosen, i.e. on the river and in an area where the activities are mainly industrial and commercial, the quieter types of turbine-driven helicopter, as well as existing piston-engined types, should be able to use it at moderate frequencies without causing a serious problem. Whether the same would apply to high frequency or night operations remains to be seen."

The committee recommends that the three sites should be officially accepted in principle and that, pending a final choice, means should be found of avoiding incompatible developments.

OPtional Reading—5

ONE reads that Major Gagarin was launched on an orbit of 65 deg. 4 min., circled the Earth and landed "in the predetermined area." Even allowing for some considerable margin in the latter expression, it is clear that very accurate navigational systems are available somewhere—anywhere, it seems, but on the air routes of the World!

In 1950 international aviation began to take serious note of VOR and, because it was known to display in the cockpit a definite and apparently sensitive indication of bearing, it was generally thought that at last we had an accurate azimuthal aid; by the time it was adopted by ICAO (COM/OPS/RAC 1959) as the standard short-range navigational aid we realized that the technical world was satisfied with a + or −5 deg. accuracy for the ground installation. This was a little disconcerting since it implied that, beyond 60 miles from the transmitter, you could have the needle smack in the middle of the dial and yet be off the airway. But it was even more disconcerting, when the aid reached extensively into the international field, to discover that the airborne receiver had its own not-so-little tolerance of + or −2 deg. So 7-deg. errors have become common and, when the siting is unfavourable, 9 deg. are not unknown. These are the successive stages by which disillusion has been spread. The situation is brought home forcibly when changing from the station behind to the one ahead and seeing the needle swing right off the dial. The boffins can argue how they like but they will be hard put to it to convince the pilot that both stations are correct.

In this connection it is interesting to note that the recent ICAO European/Mediterranean Meeting, working on the optimistic ± 5 deg. error, listed 67 routes in the lower airspace and 76 in the upper where the 10-mile-wide airway could not be held on VOR. No wonder we are a long time seeing the VOR/DME area-coverage computer! The pilot can at least worry when he sees his needle swing across the dial, but in the VOR/DME computer the averaging circuit does not faithfully replace the "worrying circuit" of the pilot and the only course the instrument could adopt at the half-way point would, presumably, be to blow a fuse.

Experience has shown that it is hazardous to mention two navigational aids in juxtaposition. But we can take it, and it certainly seems that some explanation is needed for singling out the inaccuracies of VOR while ignoring the inadequate dependability of Decca (see THE AEROPLANE AND ASTRONAUTICS, Aug. 5, 1960, p. 151). The explanation is that the VOR/DME protagonists have now led us to a fourth stage of disillusion. We have come to realize that not only were we deceived in 1950 by talk of VOR accuracies of ± 2 deg. and in 1955 by talk of ± 5 deg. but throughout these expectant years we were told that with the addition of DME to VOR we would have the complete navigational aid. *Nobody* at the ICAO Sixth COM Meeting or at the 1959 Special Meeting, when 1,000 Mc. DME was accepted as a World standard, mentioned anything about the 960-1,215 Mc. band not being reserved for civil aviation; yet *somebody* must have known that a separate, and at times conflicting, military DME system was at that time going into operation!

And now we have in Europe the ridiculous situation in which the civil pilot, using the standard ICAO aid, selects his VOR station and gets a DME reading from another station 100 miles from the VOR! Of course, he can read all about the anomaly in his various manuals (if he has time); and someone is looking into the possibility of desynchronizing the signal of the siren station. But, to be quite truthful (and to maintain the alliteration), the system stinks.—C.C.J.

Book Review

SAINT-EXUPERY. By Marcel Migeo. MacDonald. 335 pp. Illustrated. 30s. net.

TEN years' research and writing by Marcel Migeo results in the most authoritative biography of all those so far published on the life of Count Antoine de Saint-Exupéry—playboy, absent-minded air pilot, improvident introvert, philosopher, poet and misfit. The picture is not particularly attractive of gilded youth cadging money from his mother and the mature man failing to find his foothold in the World, imagining ostracism from fellow pilots, and spending seven frustrated pre-War years of self-confessed failure on lecture tours, long-distance flights that misfired, or miscellaneous journalism while seeking salutary activity to offset financial worries and a wrecked marriage. As Migeo says: "A bitter state for one who had so often declared that man must fulfil himself." Even his War efforts were shadowed with criticism and difficulty—to end a few days before the liberation of France in being shot down and killed under circumstances which can only be surmised.

However detailed and carefully prepared a biography may be, it is at best a reflection from several dark mirrors. Perhaps an author or poet does not require a biography, for it is in the written, even if limited, expression of his own thoughts that the essential man is found. With meticulous selection of word and phrase, Exupéry describes not flight itself, but the drift of thought while gaze and attention are on the physical manifestation of the sky world. His skill was in taking the reader from action to meditation with smooth, almost unrecognizable transition. Yet his books are not spontaneous but polished retrospection, compiled from essays written over a relatively long period, and often previously published in other guise. The result hints at significances which universally touch the heart. The translation of his books into many languages indicates how world-wide is their appeal.

If therefore you would seek the real Exupéry, turn to his books, and skip biography, though this volume of Migeo's will have its niche as a comprehensive effort at factual reporting. Nevertheless I found it garrulous and repetitive, and the translation often too literal for British taste. Thus describing engine controls: "In the same section of the cockpit another throttle permitted the pilot to regulate the amount of air," which with the engine throttle ". . . could be released provided they were secured firmly enough to remain in place"—but if they slipped, "it represented no real danger of a conflagration, which was very impressive for a trainee at his stage of learning." Indeed at times Marcel Migeo's description of flying manœuvres makes it hard to appreciate that he also was a pilot. His method of spin recovery was very unconstitutional. No wonder there were failures and fatalities.—H.J.P.

PUBLICATIONS RECEIVED

The Astronauts. Written by the seven astronauts of Project Mercury in collaboration with Loudon Wainwright of *Life Magazine*, this volume—expected to be the first of a series—describes the training, preparation and experiments undergone by these pioneers. An appendix contains the first full account by Cdr. Alan Shepard of his sub-orbital space flight. 112 pp. 7¼ in. by 10 in. Illustrated in black and white and colour. Cassell and Company, Ltd., 25s.

Meteorology for Glider Pilots, by C. E. Wallington. Nine chapters provide a working knowledge of meteorology, while the second half of the book draws on the author's experience as an aviation forecaster to give advice of specific value to sailplane pilots. 284 p.p. 5½ in. by 8½ in. Illustrated. John Murray, 25s.

Sir Henry Segrave, by Cyril Posthumus. Biography of the famous racing motorist who flew with the R.F.C. in World War I and lost his life in an attempt on the Water Speed Record in 1930. 228 pp. 5½ in. by 8½ in. Illustrated. B. T. Batsford, Ltd., 21s.

Seven Into Space, by Joseph N. Bell. The story of Project Mercury and the seven men chosen to become America's first astronauts. 192 pp., 5½ in. by 8 in. Illustrated. Ebury Press, 12s. 6d.

ABC Civil Aircraft Recognition, by John W. R. Taylor. The 1961 edition of this title is fully revised to include, in its main section, the latest details and photographs of the World's airliners, and in its second part pictures of most of the lighter aircraft types to be seen in Britain. In all, 91 aircraft types are covered. 64 pp., 5 in. by 7½ in. Illustrated. Ian Allan, Ltd., 2s. 6d.

Flight Today and Tomorrow, by Margaret O. Hyde. Described as an elementary book on the theory and technique of flight this volume is intended for the young reader. No previous aviation knowledge is assumed and a wide range of subjects is briefly covered. The type face is large, the paper stout, and all illustrations are pen-and-ink impressions by Colin Lee. 138 pp., 5½ in. by 8 in. Brockhampton Press, Ltd., 12s. 6d.

Reaching for the Moon, by Cord-Christian Troebst. A particularly comprehensive study of the problem of reaching the Moon by manned spaceship, introduced by a history of early hopes and concluding with a forecast of how life on the Moon will be possible. Translated from the German by Alan G. Readett. 226 pp., 5½ in. by 8 in. Illustrated. Hodder and Stoughton, Ltd., 21s.

Survey by Air

AS part of a national airborne geophysical survey programme organized by the Department of Scientific and Industrial Research, Hunting Surveys, Ltd., are currently engaged in a coverage of the western English Channel and the sea area south-west of the Bristol Channel. The company has, in previous seasons, made other airborne magnetometer surveys of Cornwall and Devon and these current operations will be magnetically tied into the previous ones.

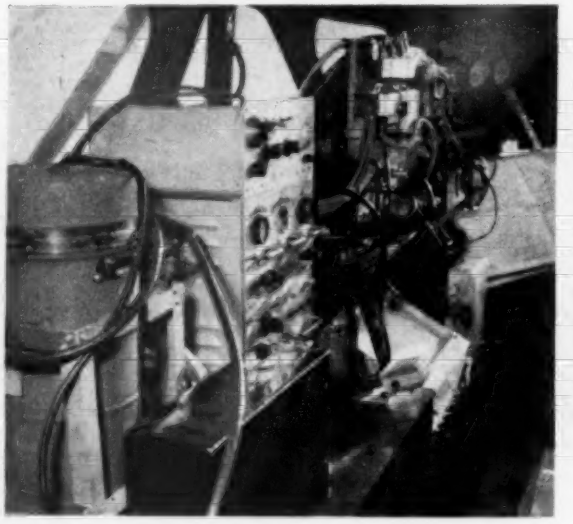
For this work a Rapide is being used and flown from Exeter and St. Just. A crew of three is carried during the survey sorties, comprising pilot, navigator and magnetometer technician/operator. Although the Rapide gives somewhat cramped accommodation for the crew and all their equipment, this aircraft is reckoned to be particularly well suited to this sort of work. The unit is in the charge of Capt. R. K. Cannon.

Altogether during this present survey, some 14,000 line miles of magnetic profile are scheduled to be flown. From this will come a total magnetic intensity map, at a scale of 1 in. to the mile—responsibility for the production of which also lies with Hunting Surveys.

The magnetometer in the cradle under the fuselage in which it stays during take-off and landing.

Above, the navigator's station in the Hunting Surveys Rapide; Decca equipment is carried for navigation and position fixing over the sea.

Below, the equipment carried leaves little spare room, but the aircraft is well suited to this sort of work.

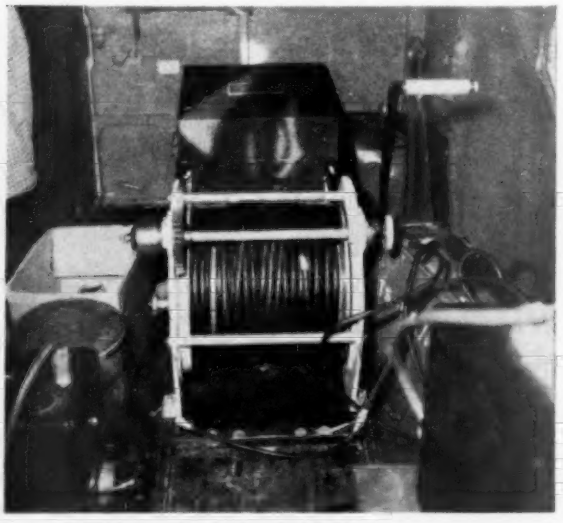


The magnetometer being used is a recording fluxgate total force instrument produced by Gulf Research and Development. For take-off and landing it is carried in a cradle, slung beneath the fuselage, from which it is streamed when the survey is being flown. An APN-1 radio altimeter is used for the accurate recording of height.

Decca equipment is installed in the Rapide for navigation and position fixing over the sea. Two sets of decometers have been provided—one at the navigator's station for *ad hoc* tracking and position checking during the sortie and the other for photographic recording so that the flight pattern can subsequently be analysed. A 35-mm. Vinten camera records all coastal crossings and land traverses.

For this survey, the whole of the area is being covered by a grid of parallel flight lines flown north-south and spaced two kilometres apart; tie-lines spaced 10 km. apart are flown east-west, and control lines at 50-km. spacing cover the whole area and are continued across the peninsula to provide a complete closed control network joining the sea areas to the north and south of the land mass, and linking this year's survey with the work of previous seasons.

The whole operation is flown at 1,000 ft. ground or sea clearance. Close planning co-operation is maintained with the commanders of firing ranges along the coast through local flying control. And notice of the operation has been given by a recent Notam published by the Ministry of Aviation.



Above, the winch used to stream the magnetometer for the survey runs.

The Fighting Services

Intelligence Appointment

AIR VICE-MARSHAL A. FOORD-KELCEY, C.B.E., A.F.C., is to become Assistant Chief of Staff (Intelligence) at the Air Ministry in September.

Entering the R.A.F. in 1935 from the Cambridge University Air Squadron, Air Vice-Marshal Foord-Kelcey began his Service career with No. 56 Squadron in 1936. Two years later he took an instructor's course at the Central Flying School after which he became a flying instructor in the Middle East. He commanded No. 8 Squadron in Aden in the early days of the War, and later No. 55 Squadron in the Western Desert.

In 1942 he was appointed C.F.I. at R.A.F. Cranwell and in 1943 attended the Staff College. In 1947 he was Wing Commander (Flying) at R.A.F. Oakington and four years later took over command of R.A.F. Stradishall. Appointed S.A.S.O. at No. 81 Group, Fighter Command, in 1954, he became Assistant Chief of Staff (Operations), A.A.F.C.E., in July, 1955. Air Vice-Marshal Foord-Kelcey has been A.O.C. of No. 11 Group, Fighter Command, since January, 1959.

Maintenance Command Reorganization

AIR COMMODORE T. E. J. FITTON is to join Headquarters, Maintenance Command, in September as Air Commodore (Technical). Introduced under a recent streamlining and reorganization of the Command, this new appointment will embody the duties previously undertaken by a Senior Technical Staff Officer.

S.T.S.O. with the Far East Air Force since March, 1959, Air Cdre. Fitton was engineering officer at the Central Flying School Handling Squadron from March, 1940, to June, 1941.

New Marks of Canberra

TWO new tactical bomber and rocket interdictor versions of the English Electric Canberra—the B.15 and the B.16—have been developed for service with R.A.F. squadrons overseas.

The Canberra B.15 is a conversion of the standard three-seat B.6, with under-wing pylons for carrying two 1,000-lb. bombs or two Microcell packs each holding 37 2-in. air-to-ground rockets. The conventional internal bomb load of six 1,000-lb. bombs and the nuclear rôle are retained.

Navaid changes include the installation of UHF and HF communications equipment, in addition to the B.6's standard VHF radio aids, and a Decca roller-map with feed-in from the aircraft's Doppler navigation system. There is also improved cabin heating for high-altitude flying in the tropics and provision for air ventilated suits.

A forward-facing F.95 camera is carried in the nose of the B.15, in addition to the existing F.24 camera in the rear fuselage aft of the bomb bay. A G.45 camera is installed in the starboard wing leading-edge.

Canberra B.15s are for operation with the Near East Air Force (Cyprus) and the Far East Air Force. The Canberra B.16 is generally identical to the B.15 but retaining particular radar aids of certain versions of the B.6.

Visitor From France

THE French Chief of Air staff, General Paul Stehlin, has been visiting the R.A.F. during the past few days at the invitation of Air Chief Marshal Sir Thomas Pike. Arriving at Northolt last Thursday morning, Gen. Stehlin made courtesy calls in Whitehall and attended an Air Council dinner in the evening.

On Friday he was to tour units of Fighter Command and on Monday visit Bomber Command. He was to be the Reviewing Officer at the passing out parade at the R.A.F. College, Cranwell, on Tuesday morning and watch a flying display in the afternoon.

Last Friday's Fighter Command programme included a briefing at Headquarters, Bentley Priory, by Air Marshal Sir Hector McGregor, followed by a visit to R.A.F. Wattisham for a display by Lightnings and Javelins. The afternoon included a briefing at a Bloodhound air defence missile site in East Anglia.

Monday's programme with Bomber Command started with a call to Command Headquarters where Gen. Stehlin was to be received by the A.O.C.-in-C., Air Marshal Sir Kenneth Cross. This was planned to be followed by a visit to R.A.F. Scampton and a Thor missile squadron.

R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

Air Ministry: Wg. Cdr. A. G. Sollis to the Department of the Air Member for Supply and Organization.

Fighter Command: Wg. Cdr. D. O. Luke to R.A.F. Leuchars to command the Flying Wing.

Transport Command: Gp. Capt. R. O. Yerbury, M.B., B.C.(Lond.), M.R.C.S., L.R.C.P., D.H.P., to Headquarters as Principal Medical Officer; Wg. Cdr. H. F. O'Neill, D.F.C., to R.A.F. Benson, to command, with acting rank of Gp. Capt.; Wg. Cdr. D. G. Bladon to R.A.F. Colerne to command the Flying Wing.

Flying Training Command: Gp. Capt. N. W. Kearon, O.B.E., to the R.A.F. Staff College, Bracknell, for Directing Staff duties; Wg. Cdr. W. P. Hopkin, D.F.C., to R.A.F. Manby as Wing Commander, Administration.

Technical Training Command: Gp. Capt. J. S. Howitt, A.F.C., M.R.C.S., L.R.C.P., to the R.A.F. Hospital, Cosford, to command; Wg. Cdr. J. F. D. Elkington to R.A.F. Locking to command No. 1 Wing; Wg. Cdr. D. I. C. Eyres to No. 2 School of Technical Training, Cosford, to command the Administrative Wing; Wg. Cdr. J. E. Malcolm, O.B.E., B.Sc., M.B., Ch.B., F.R.C.S., L.R.C.P., to Princess Mary's R.A.F. Hospital, Halton, as surgical specialist.

R.A.F. Germany: Gp. Capt. E. W. R. Fairley, M.R.C.S., L.R.C.P., D.T.M. and H., to Headquarters as Deputy Principal Medical Officer; Wg. Cdr. T. Knight, O.B.E., to the 2nd A.T.A.F. as Group Captain, Operations (O), with acting rank of Gp. Capt.; Wg. Cdr. K. R. Richardson, D.F.C., to No. 80 Squadron, R.A.F. Bruggen, to command.

Far East Air Force: Wing Commander P. F. Smith, M.B.E., to Headquarters for organization duties.

Other Appointments: Gp. Capt. K. Ritchley to the Ceylon Air Force; Wg. Cdr. D. A. Flint to R.A.F. Luqa, Malta, as Senior Technical Officer; Wg. Cdr. J. A. Wheeler-Bennett, M.R.C.S., L.R.C.P., to the Central Medical Establishment.

More Service News

NATO Competition.—For the fourth consecutive year the R.C.A.F. No. 1 Air Division has won the annual NATO air-to-air firing competition. Held at Leeuwarden Air Base, Holland, the Guynemer Trophy for the winning team was presented to Flt. Lt. R. Spencer, the R.C.A.F. leader, by H.R.H. Prince Bernhard of the Netherlands.

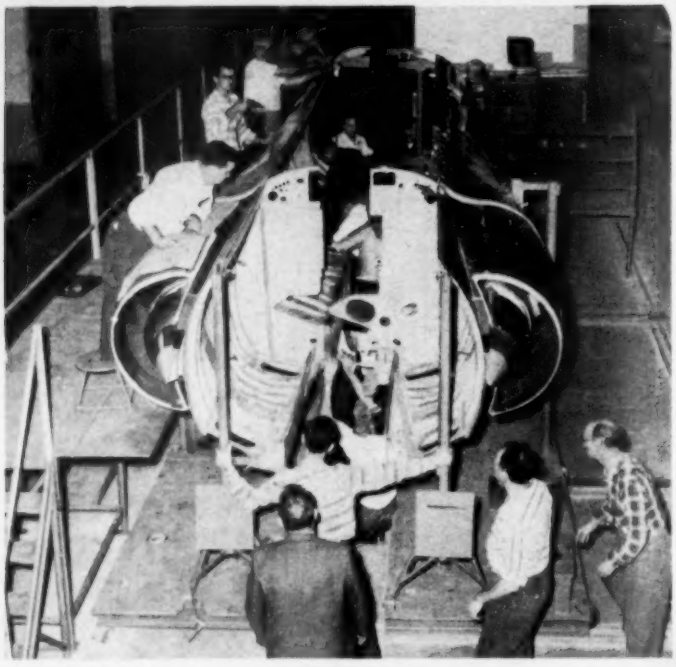
Essay Awards.—This year's annual Gordon Shephard Memorial Prize Essay Competition has been won by Air Cdre. W. Carter, Deputy Chief of Staff, CENTO, Ankara. Second place has gone to Sqn. Ldr. P. G. South, Headquarters, Middle East Command (Aden), while third prize was awarded to Gp. Capt. P. de L. Le Cheminant. Air Cdre. Carter has previously won the competition in 1955-56-57 and came second in 1960.

No. 111 Squadron Reunion.—No. 111 Squadron will be holding its 1961 all-ranks reunion at the Victory Ex-Services Club, Seymour Street, Marble Arch, London, on Sept. 30. Tickets, price £1 each, and further details may be obtained from Flg. Off. B. J. Cheater, No. 111 Squadron, R.A.F. Wattisham, Ipswich, Suffolk.

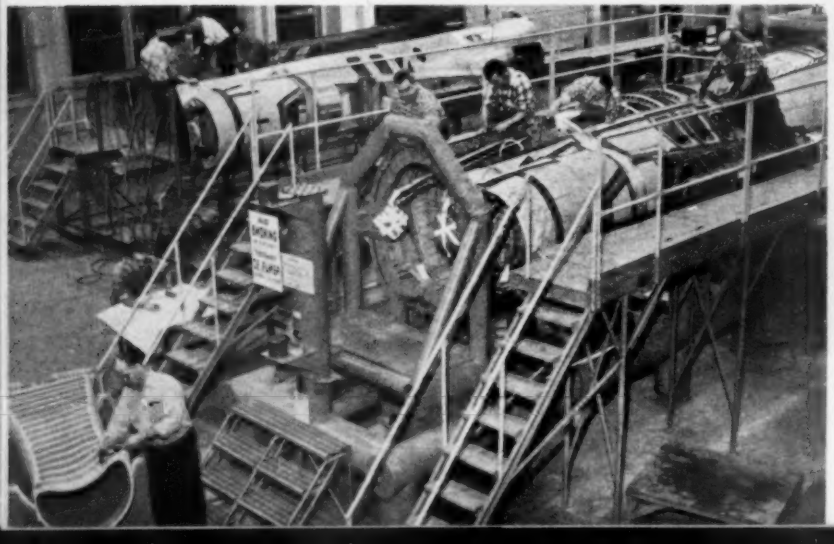
FRONT-LINE SERVICE.—Last month No. 815 Squadron (Lieut. Cdr. A. L. L. Skinner, R.N.) was commissioned as the first Fleet Air Arm squadron to be equipped with the Westland Wessex HAS.1. Here four of its new helicopters are seen at R.N.A.S. Culdrose.

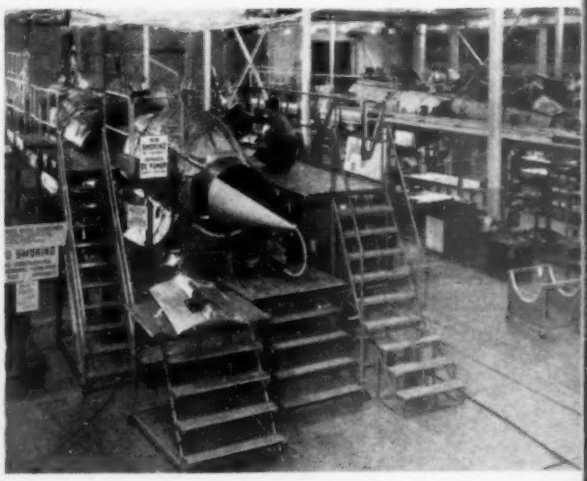
Producing the CF-104

Views of the production lines at Canadair's Montreal factory where Starfighters for the R.C.A.F. are being built in quantity.

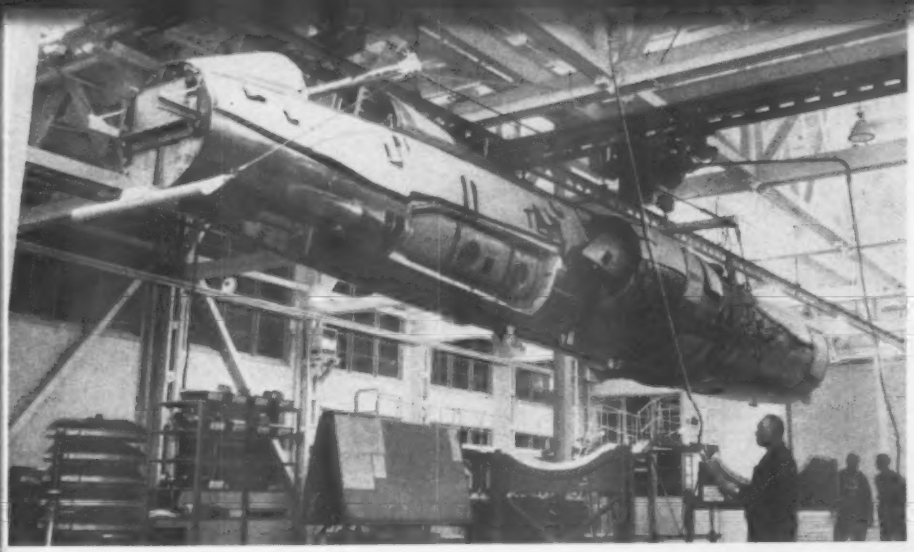


Above, centre-fuselage halves being brought together prior to installation in the mating jig. Below, a view of the centre-fuselage assembly line showing a pair of half-sections in the background.





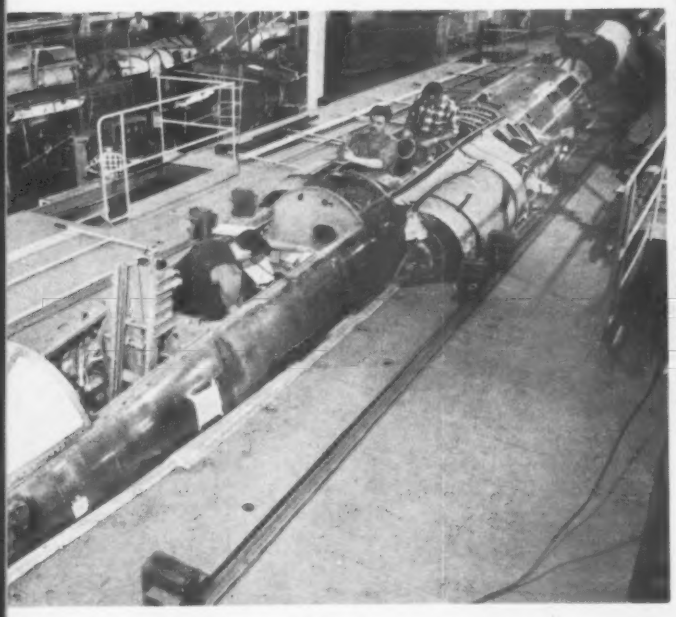
Above, a general view of the Starfighter assembly

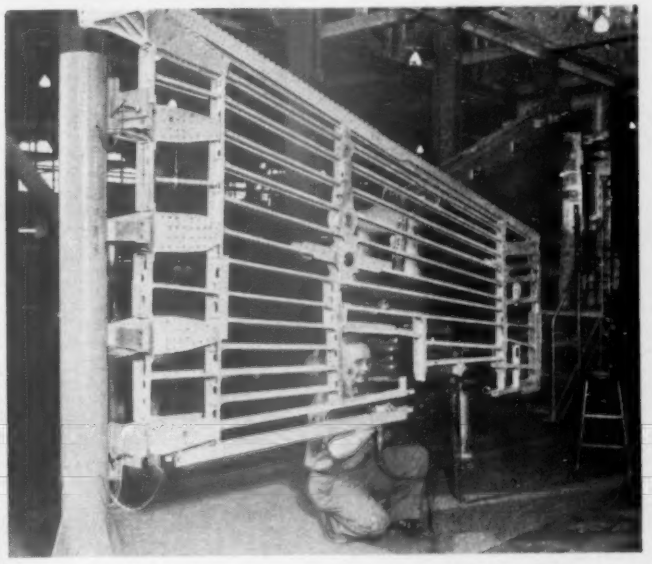


Left, a complete centre and forward fuselage section being lifted by overhead crane.

Below, the basic wing structure of the Starfighter; note the massive root end forgings.

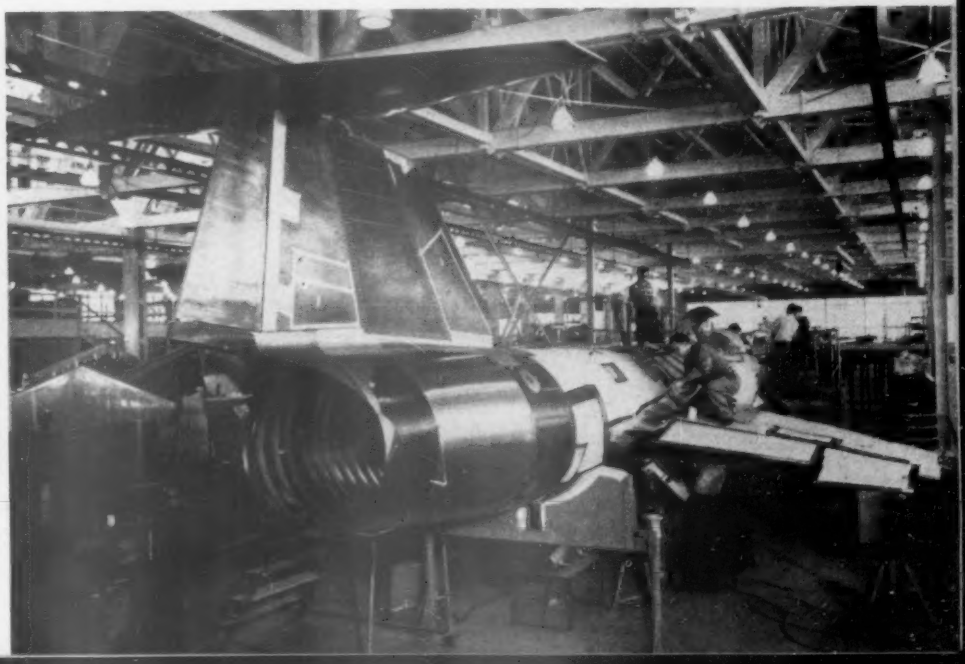
Left, number three off the line was the first to be flown at Montreal and was rolled out on Jne. 16; the first two Canadair-built CF-104s were sent to California for flight tests. Below, equipment being installed in the fuselage.





Below, a CF-104 nearing completion with tail unit and wings attached; this view emphasizes the aircraft's extremely small wings.

line at Canadair's Montreal factory.



America's New Space Probe

THE RANGER series of spacecraft heralds a new round of attempts to wrest more information from the Moon, ultimately to obtain television pictures of the lunar surface at close range and to crash-land scientific instruments in working condition (see "Project Ranger," THE AEROPLANE AND ASTRONAUTICS, Aug. 5, 1960, pp. 166-167). From this programme will also stem the Mariner spacecraft designed to survey at close hand the planets Mars and Venus.

This project is, of course, part of NASA's long-term space exploration programme for which the Jet Propulsion Laboratory of the California Institute of Technology has the responsibility for developing spacecraft for unmanned lunar and planetary exploration.

Ranger I has as its first objective the testing of spacecraft components under realistic launching conditions and, in a secondary rôle, it embodies a number of scientific experiments. The latter are designed to study the nature and activity of cosmic rays, magnetic fields, and radiation and dust particles in space; there is also an experiment which seeks to discover if the Earth carries along with it a comet-like tail of hydrogen gas.

For the first experimental mission, the spacecraft was programmed to perform a non-lunar trajectory extending some 500,000 miles into space. If the firing went according to plan, it was calculated that the vehicle would ultimately return to the Earth's atmosphere and burn up after a period of some 50 days. There was, however, a slight possibility that, with the expected dispersion in rocket performance, the vehicle might reach escape velocity and enter an orbit around the Sun.

Principal elements under test in the spacecraft include an attitude stabilization system based on celestial references (Sun and Earth), a high-gain pointable antenna, an advanced communication system, long-life components, and solar cells which it was proposed to calibrate in a space environment.

Project Development

In developing the Ranger programme, the Jet Propulsion Laboratory first established a basic design which was capable of being maintained throughout a generation of spacecraft despite varying missions. Out of this concept came the idea of a hexagonal-shaped basic configuration to carry the electronics and other instrumentation which, so far as possible, will remain standard for many vehicles. This, of course, is in agreement with the philosophy now being pursued throughout NASA's space-vehicle programmes which seeks to raise reliability standards by using the same types of components many times.

Flight Simulation

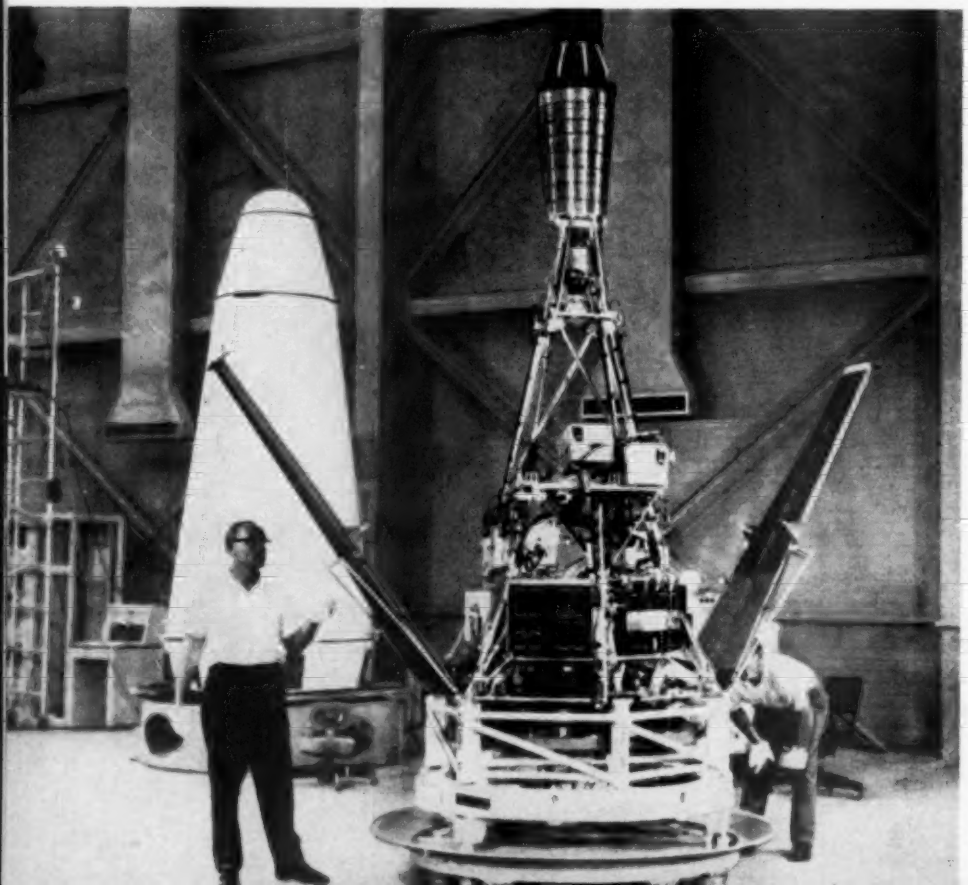
In designing Ranger I, considerable importance was attached to a prototype called the Proof Test Model (PTM). This PTM was made as nearly identical to the flight model as possible, down to the last nut and bolt, and was subjected to a series of severe bench tests. It was vibrated at frequencies in excess of anything likely to be experienced under launching conditions, subjected to temperatures between 32° and 122° F., and exposed to vacuum conditions down to 0.00001 mm. of mercury.

A series of "dummy runs" followed, involving simulated count downs and simulated flights. Tests were made of the attitude control system, and experiments were performed on the Earth and Sun sensors and the functioning of the solar panels. Not only did these tests provide valuable data leading to improvements in the flight model, but they enabled the JPL team to gain much valuable experience in handling the spacecraft under realistic pre-launch conditions.

The climax to this preliminary work came in April this year when the PTM vehicle was sent to Sunnyvale, California, for compatibility trials with the Agena B second-stage rocket at the Lockheed Missiles and Space Company.

Work on the flight prototype, meanwhile, had begun in early February, 1961, and lessons learned on the PTM were incorporated into the flight model as work proceeded. By the end of May, the completed spacecraft had arrived at Cape Canaveral where it underwent a series of tests, some of which lasted as long as eight hours, to ensure that the delicate electronic equipment was still in good condition after the long journey by road from Pasadena. These tests were continued almost to the day of launching.

Details of Ranger I can be seen in the accompanying photograph; the spacecraft is slightly more than 5 ft. in diameter at the base of the hexagon and 11 ft. long. In its "cruise position," with solar panels extended to intercept solar energy, it spans 17 ft. The total weight is 675 lb.



Checking the action of the two extensible solar panels on Ranger I in the Jet Propulsion Laboratory at Caltec in Pasadena.

Rising from the hexagonal base are four struts and four diagonal braces made of aluminium which serve to support the scientific instrumentation. Two radio transmitters and two antennae are fitted. There is an omnidirectional antenna at the front end and a high gain directional antenna of 4 ft. diameter at the spacecraft's base. The intention is for this lattter antenna to be aimed at the Earth when the vehicle is well out in space to permit more efficient transmission of data.

Each of the two solar panels has an area of 10 sq. ft. and contains 4,340 solar cells; they are expected to produce a minimum of 155 w. and a maximum of 210 w. The panels are hinged on framework below the hexagon and in the launch position are carried folded in the manner of butterfly wings.

In the hollow inner section of the hexagon is a silver zinc 125 lb. battery with a capacity of 9,000 watt hours. This battery will provide the power to run the spacecraft prior to the time of acquisition of the Sun by the solar panels, and also will serve as a backup power source if the solar acquisition is not successful. There is enough battery power to operate the vehicle for two days.

The two radio transmitters aboard Ranger I are designed to telemeter information to Earth (via the omnidirectional antenna) before the solar cells come into use. A 3-w. transmitter will send on a frequency near 960 Mc/s. and a separate quarter-watt transmitter will radiate on a similar frequency. The smaller transmitter has a lifetime of seven days and will remain in operation continuously until its battery is exhausted.

Black-box Controls

Six "black boxes" located on each side of the hexagonal base are the controlling intelligence for Ranger I. Of these, the spacecraft controller is the most important. It is this device which allows the space vehicle to calculate, electronically, when it should perform a certain function, how it should roll and pitch to find the Sun and lock on to this power source with its solar panels. It will also determine how to find the Earth and aim its directional antenna at the Earth, as well as govern many other functions.

The spacecraft controller is an electronic solid-state timer. It takes 400 cycles/sec. from the spacecraft power supply and divides it into one pulse per second, and uses these pulses (which are accumulated in a storage device) as the basic timing reference. The memory unit has a pre-set series of triggers. When the accumulated pulses per second match the pre-set count stored in the memory device, a relay is closed and the controller issues a command for the vehicle to perform some specific function.

From the moment of launching to the end of its useful life, there are 10 commands that the controller must issue. Hence there are 10 such channels and 10 such relays.

The controller timer is started three minutes before launching. This time then serves as the reference point for future commands to be issued by the controller. When the spacecraft is turned on—from power supplied by the large silver zinc battery inside the hexagon—most of the scientific instruments, and both the ¼-w. and 3-w. transmitters begin to operate.

However, at this stage, some instruments are not energized, notably the solar corpuscular detectors, and the 3-w. transmitter is given only enough power to run at half strength. This is done because, as the rocket booster passes through a critical region in the atmosphere between 150,000 and 250,000 ft., there is a tendency for devices using high voltage to arc over and damage themselves; hence these are turned on by the controller after this period is passed.

Launching Procedure

Mounted in the nose of Atlas-Agena B, the Ranger spacecraft is protected from the effects of aerodynamic heating by a shroud. This is jettisoned after Atlas propulsion ceases, at about 280 sec., being pushed forward by eight spring-loaded bolts. At almost the same time, Agena B separates from the Atlas sustainer.

Immediately following separation, the Agena B stage pitches down, from an attitude almost 15° above the local horizon, to assume an almost level attitude. In this horizontal mode, Agena B fires for the first time, remaining under thrust for nearly 2½ min. until orbital velocity is reached at approximately 18,000 m.p.h. With engine out the top stage coasts in a parking orbit for more than 13 minutes until it reaches the optimum point in time and space to fire for the second time.

In the first Ranger launching the "parking orbit" procedure is not important. It was incorporated merely as a test of the techniques to be used in later missions aimed at the Moon.

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Height	11 ft.
In cruise position, solar panels unfolded:	
Span	17 ft.
Height	13 ft.
Gross weight	675 lb.
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Electronic packages	243 lb.
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Tracking stations for this mission are provided by the Deep Space Instrumentation Facility (DSIF) and consist of the three 85-ft. directional antenna and supporting facilities at Johannesburg, South Africa; Woomera, Australia; and Goldstone in California. As they are located approximately 120° apart around the globe, the three stations can provide 360° coverage around the Earth, so that one of the three always will be able to communicate with a distant spacecraft.

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Next Firings

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For the lunar mission, the Ranger spacecraft, in addition to having full attitude stabilization, will carry its own propulsion system permitting mid-course manœuvres.

America's New Space Probe

THE RANGER series of spacecraft heralds a new round of attempts to wrest more information from the Moon, ultimately to obtain television pictures of the lunar surface at close range and to crash-land scientific instruments in working condition (see "Project Ranger," THE AEROPLANE AND ASTRONAUTICS, Aug. 5, 1960, pp. 166-167). From this programme will also stem the Mariner spacecraft designed to survey at close hand the planets Mars and Venus.

This project is, of course, part of NASA's long-term space exploration programme for which the Jet Propulsion Laboratory of the California Institute of Technology has the responsibility for developing spacecraft for unmanned lunar and planetary exploration.

Ranger I has as its first objective the testing of spacecraft components under realistic launching conditions and, in a secondary rôle, it embodies a number of scientific experiments. The latter are designed to study the nature and activity of cosmic rays, magnetic fields, and radiation and dust particles in space; there is also an experiment which seeks to discover if the Earth carries along with it a comet-like tail of hydrogen gas.

For the first experimental mission, the spacecraft was programmed to perform a non-lunar trajectory extending some 500,000 miles into space. If the firing went according to plan, it was calculated that the vehicle would ultimately return to the Earth's atmosphere and burn up after a period of some 50 days. There was, however, a slight possibility that, with the expected dispersion in rocket performance, the vehicle might reach escape velocity and enter an orbit around the Sun.

Principal elements under test in the spacecraft include an attitude stabilization system based on celestial references (Sun and Earth), a high-gain pointable antenna, an advanced communication system, long-life components, and solar cells which it was proposed to calibrate in a space environment.

Project Development

In developing the Ranger programme, the Jet Propulsion Laboratory first established a basic design which was capable of being maintained throughout a generation of spacecraft despite varying missions. Out of this concept came the idea of a hexagonal-shaped basic configuration to carry the electronics and other instrumentation which, so far as possible, will remain standard for many vehicles. This, of course, is in agreement with the philosophy now being pursued throughout NASA's space-vehicle programmes which seeks to raise reliability standards by using the same types of components many times.

Flight Simulation

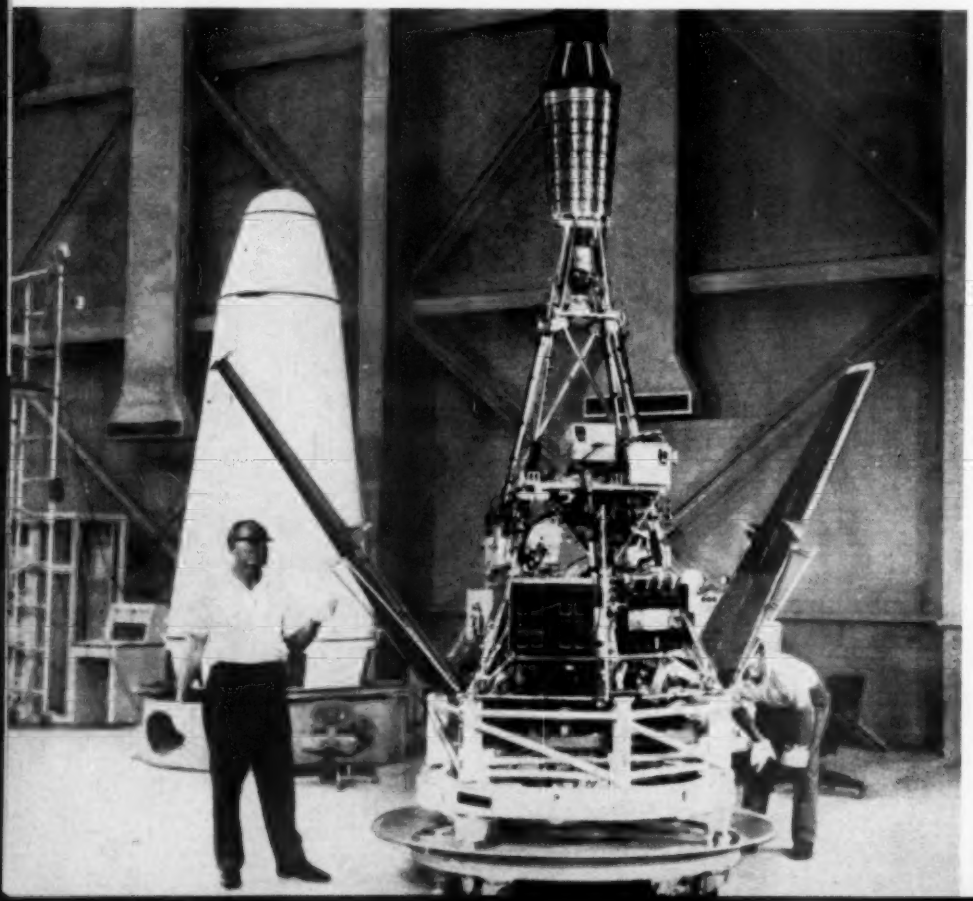
In designing Ranger I, considerable importance was attached to a prototype called the Proof Test Model (PTM). This PTM was made as nearly identical to the flight model as possible, down to the last nut and bolt, and was subjected to a series of severe bench tests. It was vibrated at frequencies in excess of anything likely to be experienced under launching conditions, subjected to temperatures between 32° and 122° F., and exposed to vacuum conditions down to 0.00001 mm. of mercury.

A series of "dummy runs" followed, involving simulated count downs and simulated flights. Tests were made of the attitude control system, and experiments were performed on the Earth and Sun sensors and the functioning of the solar panels. Not only did these tests provide valuable data leading to improvements in the flight model, but they enabled the JPL team to gain much valuable experience in handling the spacecraft under realistic pre-launch conditions.

The climax to this preliminary work came in April this year when the PTM vehicle was sent to Sunnyvale, California, for compatibility trials with the Agena B second-stage rocket at the Lockheed Missiles and Space Company.

Work on the flight prototype, meanwhile, had begun in early February, 1961, and lessons learned on the PTM were incorporated into the flight model as work proceeded. By the end of May, the completed spacecraft had arrived at Cape Canaveral where it underwent a series of tests, some of which lasted as long as eight hours, to ensure that the delicate electronic equipment was still in good condition after the long journey by road from Pasadena. These tests were continued almost to the day of launching.

Details of Ranger I can be seen in the accompanying photograph; the spacecraft is slightly more than 5 ft. in diameter at the base of the hexagon and 11 ft. long. In its "cruise position," with solar panels extended to intercept solar energy, it spans 17 ft. The total weight is 675 lb.



Checking the action of the two extensible solar panels on Ranger I in the Jet Propulsion Laboratory at Caltec in Pasadena.

Rising from the hexagonal base are four struts and four diagonal braces made of aluminium which serve to support the scientific instrumentation. Two radio transmitters and two antennae are fitted. There is an omnidirectional antenna at the front end and a high gain directional antenna of 4 ft. diameter at the spacecraft's base. The intention is for this lattter antenna to be aimed at the Earth when the vehicle is well out in space to permit more efficient transmission of data.

Each of the two solar panels has an area of 10 sq. ft. and contains 4,340 solar cells; they are expected to produce a minimum of 155 w. and a maximum of 210 w. The panels are hinged on framework below the hexagon and in the launch position are carried folded in the manner of butterfly wings.

In the hollow inner section of the hexagon is a silver zinc 125 lb. battery with a capacity of 9,000 watt hours. This battery will provide the power to run the spacecraft prior to the time of acquisition of the Sun by the solar panels, and also will serve as a backup power source if the solar acquisition is not successful. There is enough battery power to operate the vehicle for two days.

The two radio transmitters aboard Ranger I are designed to telemeter information to Earth (via the omnidirectional antenna) before the solar cells come into use. A 3-w. transmitter will send on a frequency near 960 Mc/s. and a separate quarter-watt transmitter will radiate on a similar frequency. The smaller transmitter has a lifetime of seven days and will remain in operation continuously until its battery is exhausted.

Black-box Controls

Six "black boxes" located on each side of the hexagonal base are the controlling intelligence for Ranger I. Of these, the spacecraft controller is the most important. It is this device which allows the space vehicle to calculate, electronically, when it should perform a certain function, how it should roll and pitch to find the Sun and lock on to this power source with its solar panels. It will also determine how to find the Earth and aim its directional antenna at the Earth, as well as govern many other functions.

The spacecraft controller is an electronic solid-state timer. It takes 400 cycles/sec. from the spacecraft power supply and divides it into one pulse per second, and uses these pulses (which are accumulated in a storage device) as the basic timing reference. The memory unit has a pre-set series of triggers. When the accumulated pulses per second match the pre-set count stored in the memory device, a relay is closed and the controller issues a command for the vehicle to perform some specific function.

From the moment of launching to the end of its useful life, there are 10 commands that the controller must issue. Hence there are 10 such channels and 10 such relays.

The controller timer is started three minutes before launching. This time then serves as the reference point for future commands to be issued by the controller. When the spacecraft is turned on—from power supplied by the large silver zinc battery inside the hexagon—most of the scientific instruments, and both the ¼-w. and 3-w. transmitters begin to operate.

However, at this stage, some instruments are not energized, notably the solar corpuscular detectors, and the 3-w. transmitter is given only enough power to run at half strength. This is done because, as the rocket booster passes through a critical region in the atmosphere between 150,000 and 250,000 ft., there is a tendency for devices using high voltage to arc over and damage themselves; hence these are turned on by the controller after this period is passed.

Launching Procedure

Mounted in the nose of Atlas-Agena B, the Ranger spacecraft is protected from the effects of aerodynamic heating by a shroud. This is jettisoned after Atlas propulsion ceases, at about 280 sec., being pushed forward by eight spring-loaded bolts. At almost the same time, Agena B separates from the Atlas sustainer.

Immediately following separation, the Agena B stage pitches down, from an attitude almost 15° above the local horizon, to assume an almost level attitude. In this horizontal mode, Agena B fires for the first time, remaining under thrust for nearly 2½ min. until orbital velocity is reached at approximately 18,000 m.p.h. With engine out the top stage coasts in a parking orbit for more than 13 minutes until it reaches the optimum point in time and space to fire for the second time.

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Space Boosters Wet and Dry

TO help determine the shape of things to come in the field of huge space boosters, NASA has initiated studies for rocket vehicles which employ mixed systems of solid and liquid propellents. A contract worth $100,000 has recently been awarded to the Boeing Company of Seattle by the George C. Marshall Space Flight Center.

The vehicles under consideration will be in the Saturn/Nova class, capable of placing from 50,000 to 350,000 lb. in a 300-mile Earth orbit. In this early work, Boeing will draw upon data provided by three earlier solid "super-booster" studies conducted for NASA by Aerojet-General Corporation, Grand Central Rocket Company and Thiokol Chemical Corporation.

The six-month study will concentrate on "total launch vehicle systems engineering and the overall logistics of space booster operations under realistic conditions." Two families of vehicles will be considered, those with a solid first stage and high-energy liquid second stage, and those with solid rockets for the first two stages and a liquid-propellent third stage. It is assumed that all top stages would be powered by LO_2/LH_2.

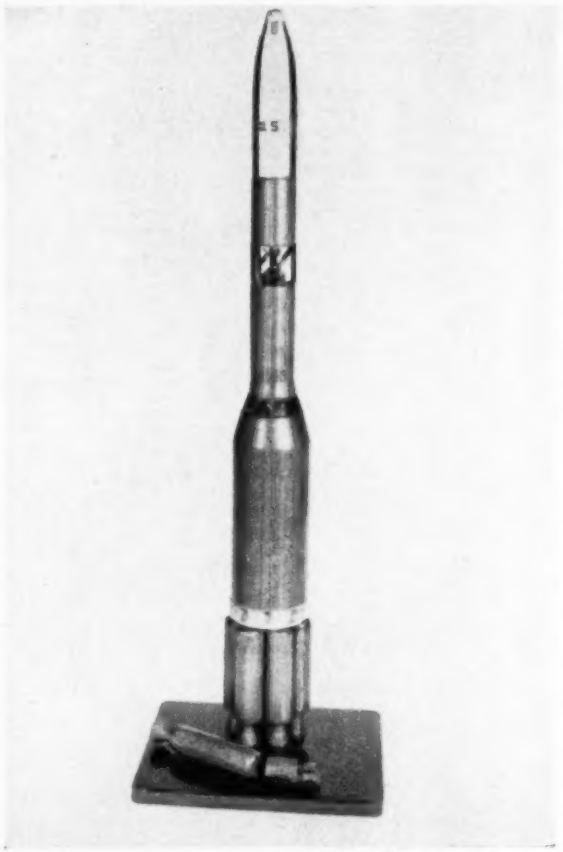
For the purposes of the study, the solid units may consist of a large single unit or a cluster of motors, segmented or in a single case. The possibility of recovering individual spent stages is also being considered.

Earlier this year, the Thiokol Chemical Corporation recommended to NASA the development of a 3 million-lb.-thrust solid rocket engine. This, they suggested, could provide a super-boost cluster of seven units in the first stage and three in the second; upper stages would have high-energy liquid propellents.

The total average thrust achieved by the initial stage would be 21 million lb. during an extended burning period, and it was Thiokol's claim that a space-booster built on these lines would constitute the most economical approach to massive space-boosters for manned exploration requirements in the latter half of the decade. The other solid propellent companies reported similar conclusions.

The Thiokol studies considered solid engines ranging in diameter from 10 to 28 ft., but the one selected as the best for development has a diameter of about 14 ft. It is estimated that a unit of this size could be developed in three years, and that the total space-booster could be ready for use in manned exploration programmes within five years. It would have the capability of launching more than 300,000 lb. into a close-orbit around the Earth or could accelerate a payload of 125,000 lb. to escape velocity.

One of the advantages claimed for Thiokol's clusterable engine is that the individual units can be moved by existing transportation methods. The fact that it could be clustered in various arrangements to provide larger or smaller boosters was another important factor.



Howard Levy photograph

Proposed Thiokol "super-booster" of 21 million lb. initial thrust which would stand 250-300 ft. tall. Note relative size of solid-propellent engine unit and lorry transporter at base.

Surveillance from Orbit

THE Russian Army newspaper, *Red Star*, stated on Jly. 23 that the launching of the United States satellites Midas and Tiros was an act of aggression. The former is designed to detect the launching of ballistic missiles by picking up heat radiation emitted by their engines, and the latter is equipped with small TV cameras and infra-red sensors for securing meteorological information.

"No matter at what altitude the spies are flying they remain spies," the newspaper said. "The Pentagon has not given up its earlier plans of spy measures aimed against the Socialist camp. After having failed in espionage by means of aerial intelligence, the military leaders of the United States are persistently using outer space for that purpose."

Latest version XM-50, 762-mm. "Honest John" rocket is some 200 lb. lighter than previous models. Fins are smaller, weighing but 25-30 lb., as compared to 60 lb. on the early rocket. It is also shorter, has an improved electrical system, as well as detachable launching shoes. Spin rockets have been reduced by half—only 4 on this new experimental missile.

Howard Levy photograph

Flying the Rollason Condor

by

John Fricker

THE flourishing ultra-light movement in France, which is the basis of the extensive club and private flying interest, owes a great deal to the late Roger Druine. Before his untimely death in 1958, he had designed the single-seat Turbulent, which is probably the most widely built aircraft by amateur constructors throughout the World, and the two-seat Turbi, of equally simple concept. His last design, the Condor, which is also a two-seater, although with side-by-side accommodation instead of tandem, was intended mainly for professional production, but once again a simplified version was made available for the amateur.

Although differing radically from the American approach to mass flight, by having wooden airframes and tailwheel undercarriages these unambitious little aeroplanes have brought flying within the reach of many thousands of people who would otherwise have been unable to savour its joys. Roger Druine has enabled enthusiasts in nearly every country of the World to become airborne as the fruits of their own toil and endeavour, and for this alone he deserves to be remembered.

As champion of the lone private pilot, and producer of the Turbulent in this country, Rollason director and Tiger Club chairman Norman Jones has taken these ideas a stage further in building the Condor with the aim of introducing a really low-cost trainer for club or group use. His intention is to offer a fully equipped two-seater, with a full blind-flying panel and comprehensive ratio, plus all the essential conveniences of starter, generator, brakes, flaps, etc., for less than £2,500, with correspondingly low running costs, and a reasonable performance.

Low costs mean low power, and the prototype Rollason Condor D.61 G-ARHZ, which is at an early stage of its development trials, is fitted with a 75-b.h.p. Continental flat-four engine, driving a two-bladed wooden airscrew. The D.61 was designed for the 65-b.h.p. Continental, so that G-ARHZ has a little extra power to cope with its additional equipment, although its airframe includes many features of the more potent D.62. One of the other two Condors to be laid down by Rollasons at Croydon will have the 90/100-b.h.p. Continental specified for the original Druine D.62.

A glance in the engine bay of G-ARHZ last week at Redhill showed ample room for a larger powerplant, which will be used to obtain a C. of A. for the design. The prototype Rollason Condor is currently operating on a Permit-to-Fly, which is possible with its 75-b.h.p. engine and by limiting its gross weight to the upper limit of 1,200 lb. Because of the extra equipment carried and the D.62 features, operating within that weight limit can only be achieved at the moment when solo and with not more than 10 gal. of fuel on board.

Maximum capacity of the front fuselage tank with its simple wire float indicator is 18 gal., but I had the statutory load at the time of my solo flight. A quick pre-flight check of the Condor showed the usual high standard of Rollason workmanship in the wooden and fabric airframe, and a positive relationship to the French Jodel lightplanes for which the company are U.K. agents.

The undercarriage, for example, is similar to that of the much heavier Ambassadeur, so is suitably robust for training, and several items in the cockpit, as well as the canopy itself, follow Jodel practice. These include the U-shaped dual stick yoke, and the very positive central ratchet parking brake. Differential braking is obtainable from extreme rudder pedal travel, and ground manœuvrability is also helped by a steerable tailwheel.

The cockpit itself comes as quite a surprise for an ultra-light aeroplane. Broad walkways on the wing roots and fuselage steps ease access, which is also helped by the low sills of the upward-hinging doors. Inside, there is a vast amount of room for so small an aeroplane, the cabin being very wide, and with ample head clearance. It is comfortably upholstered, and there is a large shelf behind the seats for hand baggage.

Except for the absence of a V.S.I., G-ARHZ has a full flight panel, albeit slightly unorthodox in layout, across the wide front dash. Engine instruments are situated way over to starboard, but the collection of knobs for carb. heat, master switch and mixture control are closer to hand at the left-hand end. Next to them, on the cabin wall, is the control box for the Ekco 11-channel VHF radio. Remaining controls comprise the rather short press-button lever between the seats for flap operation, and an Auster-type trim handle in the roof.

View over the flat-topped cowling is excellent, and the big tinted canopy offers very little obstruction to lateral visibility. On the ground, the Condor sits in a very flat attitude, so that, with the excellent directional control, taxi-ing is as simple as in a tricycle type. Undercarriage shock absorption is above average for a light aeroplane, and ground stability is good.

The noise level is also commendably low, on opening up for take-off. With central trim and the first degree of flap lowered, the Condor seems to fly itself off the ground after a very short run, although the rate of climb is no more than one would expect from an ultra-light. With the central throttle plunger pushed fully in, the Continental turned over at about 2,550 r.p.m. during the climb, which seemed to be best at 45-50 knots, maximum permissible r.p.m. being 2,700.

Once airborne, the Condor flew confidently and steadily, with well co-ordinated controls. I found the ailerons required slightly more effort than one would have expected for their initial displacement, but lateral response was pleasantly brisk. A certain amount of hold-off was necessary to prevent a tendency for large angles of bank to increase. Elevator sensitivity is high; an inch or two of stick movement results in quite large alterations of airspeed.

The propeller currently fitted seems slightly too fine, and it

is possible to over-rev. the Continental before throttling back for cruising flight. With the recommended 2,500 r.p.m. set up, the Condor settled down to indicate about 75 knots (86 m.p.h.) which is about what one would expect for a little ultra-light. It is somewhat below the design cruising speed, which is about 10 knots higher, probably because of the fine-pitch airscrew on the Rollason prototype and a so-far uncalibrated position error. With a design diving speed of 147 knots, the Condor appears to have excellent strength factors.

Like all ultra-light designs, the Condor has very small trim changes, in keeping with its light control forces. At the low-speed end of the scale, control effectiveness is retained as the nose is raised and the throttle closed, the stall coming abruptly at about 30 knots I.A.S., with a slight starboard wing drop. Loss of height, however, before regaining flying speed seemed to be less than 50 ft. With full flap, lowered before the present precautionary limit of 50 knots, the airspeed goes down to about 25 knots before encountering slight pre-stall buffet and breakaway.

Flaps were not fitted to earlier versions of the Condor, but those in G-ARHZ are very effective. Three degrees of extension are possible, and the full flap position I found gave a surprisingly high rate of sink. For my first landing, I reduced speed from 45 to 40 knots on finals, which seemed quite comfortable, but there was virtually no flare-out on rotating to the three-point position, the Condor settling immediately and decisively, although gently, on the ground.

The elevator must remain very effective at minimum flight speeds, and on my second landing, maintaining 45 knots, power off, resulted in a tailwheel-first touch-down after a brief float. Ground cushion effect from the low wing seems to help the landing process, which is almost, but not quite, as easy as the tricycle technique. The Condor might thus earn a place as a progressional trainer between the classic and modern types of flying.

Whether or not it can perform this function, with all the equipment currently fitted, within the official ultra-light category as a two-seater is a matter for discussion. Quite a lot of weight can be saved in future developments and one of the aircraft currently being built with a more powerful Continental should provide the answer. The 100-b.h.p. O-200 engines should eventually be available from Rolls-Royce, which will help both production and price of the Condor, and the forthcoming simplification of airworthiness requirements for light aircraft in the public transport category should reduce the complications and expense of certification.

Leading Particulars

Dimensions.—Span, 30 ft. 2 in.; length, 21 ft. 6 in.; height, 5 ft.; wing area, 134.5 sq. ft.

Weights.—Empty, 820 lb.; equipped, with radio, generator, battery, etc., 928 lb.; max. gross (on permit), 1,200 lb.; design gross, 1,367 lb.

Performance.—Cruising speed, 101 m.p.h.; initial climb, 698 ft./min.; stalling speed, 34.5 m.p.h.; range, 300 miles.

Gliding Notes

by Dr. A. E. Slater

BRISTOL GLIDING CLUB announces a flying rally for the week-end Sept. 2-3, with a barbecue and dance on the Saturday evening. There is room for 20 teams, and entries should be in by Aug. 12. Aero-towing will be laid on, to be replaced by winch launches if there is a good wind blowing up the hill.

The latest notable flight from the club was a goal-and-return of 180 miles to Oswestry and back by Tony Gaze and Rosemary Storey in an Eagle, which beats the previous British record of 148 miles set up by D. J. Corbett and H. Hilditch of Lasham.

New additions to the fleet, expected shortly, are a Swallow and a two-seater Slingsby T-49.

* * *

DURING the Astronautics Seminar at Southampton University, a privileged few were taken down to a basement to see the man-power flying machine by the charming aerodynamiciste who is a member of the group working on it. It is still under construction, and we were under a pledge of secrecy not to divulge anything that the rival group at Hatfield, which is also in the running for the Kremer prize, doesn't know about it already. But there can be no harm in giving the group's estimate that, if fitted with a one man-power motor, the machine would only need 5 gallons of petrol to cross the Atlantic, in 52 hours.

When it is ready, Derek Piggott will be towed by winch at a low altitude across Lasham aerodrome to test the controls. But the first human muscles to keep it in the air will be those of Martin Hyman, a graduate of Southampton University and an Olympic athlete, who is now learning to glide at Lasham.

Terence Nonweiler, lecturing at the Seminar on his favourite "re-entry problem," for which he favours a gliding technique, has been unable to get support at Belfast for his two-seater man-powered machine, which is more economical than a single-seater aerodynamically though not financially. However, he is about to become a Professor at Glasgow, where he is hoping for more support.

The late Gus Raspet worked out that the most efficient man-powered aircraft should have 5 pedallers; beyond that number the weight per man rises again.

* * *

DENMARK'S national championships, held from Jly. 2 to 14, were unlucky with the weather, Per Weishaupt writes. The Air Force provided four tugs at Vandel military aerodrome near Vejle in Jutland, and 29 sailplanes took part.

On the first contest day Ib Braes in a Ka-6 won a 58-mile race to Sonderborg at 56 m.p.h.; 24 got there. Then, after five no-contest days, came the new type of task introduced at our Championships this year: 20 miles E.N.E. to a specified turning point and then free distance beyond it. As in England, they scattered in many directions; some tried the longest landward run to the north but didn't make it, while others went S.E. till the Great Belt stopped them. Niels Jensen won in a Ka-8 with 83 miles.

Next day, Jly. 10, four people won a 47-mile race in a high wind at exactly the same speed of 110 km.p.h. (68.35 m.p.h.). Then a warm front spread over the sky, but in spite of it Per Weishaupt won a set-line contest with 55 miles in an L-Spatz.

On the last flying day, Jly. 12, in worse weather, only the first to be launched, Niels Sejstrup, got round a 100-km. triangle. With this, Sejstrup regained the championship which he held in 1959, totalling 4,258 points; Weishaupt came 2nd with 3,485 and Axel Feddersen 3rd with 3,405.

The two-seater class was won by Ole Didriksen and Henning Kjaergaard in an East German Lehrmeister. There are nine of this type now flying in Denmark, mainly for training beginners; they cost no more, Weishaupt says, than a cheap single-seater.

In contrast to July, May was good in Denmark and the spring northerlies facilitated a number of 300-km. flights, some of them into Germany. On Whit Sunday the 2nd and 3rd 300-km. triangle flights within Danish territory were done; one of them, at 30.88 m.p.h. by V. P. Jensen, was a Danish record, and so was a 200-km. triangle at 37.3 m.p.h. by Didriksen on May 28.

* * *

BLACKMORE VALE Gliding Club has joined the British Gliding Association, having got the use of the former naval aerodrome at Henstridge, near Sherborne. A T-21 and Tutor are on the way, and some cottages are available for a clubhouse.

But the West Sussex County Council have told the B.G.A. that they object to "aircraft" flying at Ford aerodrome, whose hangars are up for auction while the grass between the runways is to go back to farmers. Since the Planning Committee objects to fuel tanks being used near the old church, it would seem that the authorities are unable to distinguish between various forms of aviation.

* * *

DERBYSHIRE AND LANCASHIRE CLUB now have a full complement of 25 entries for the Northern Gliding Competitions at Camphill from Jly. 29 to Aug. 7, with at least 42 pilots taking turns at flying. This nearly reaches the 28 entries they had at the last pre-war National Contests, though 62 pilots shared the machines then.

Correspondence

Crew Fatigue

YOUR correspondent C. C. J. in his column OPtional Reading 3 of your issue of Jly. 20, makes some observations on the effect of crew fatigue and the introduction of jet aircraft which are not strictly in accordance with the facts.

I realize to fit his theory, that operators generally have given little thought to this question, his statements on the introduction of Comets by B.O.A.C. conform with the pattern he is endeavouring to prove. However, it would have been better if he had taken care to discover the true facts since, had he done so, he would then not have quoted the Comet operation to support his theory.

I cannot answer for any other airline mentioned by him as planning jet operations for pilots at a rate of 85-90 hours per month but am in a position to state that the B.O.A.C. Comet 1 operation was planned, from the start, on a pilot utilization rate of 550 hours per annum: in fact, the overall average rate achieved was nearer 500 hours per annum than the planned 550 hours between May, 1952 and January, 1954. If indeed the sickness rate was higher on Comets than on other Corporation current operations at the time—my recollection is that it was not—then C. C. J. will have to find some other reason than overwork for this.

A. P. W. CANE (Captain)
(Ex-Flight Superintendent Comet 1).

Dorney Reach, Bucks.

No. 216's Equipment

YOUR correspondent regarding Squadron Facts, in your issue of Jly. 20, is quite correct. No. 216 Squadron, R.A.F., did not have D.H.10s in France.

They flew to Egypt, via Italy, with H.P.O/400s, about August 1918, and were later equipped with D.H.10s but this type was not operational in France.

London, S.W.3. W. A. RAMSAY.

The Last Sunderland

WHILE I have the greatest respect in general for the informative letters of Dennis M. Powell, I disagree with him on all counts about the last Sunderland built. It was not a Mk. IV, it did not come from Blackburn's and it was not serialled PP164.

The last Sunderland completed at Blackburn's Dumbarton works was VB886, a Mk. V accepted by the R.A.F. on Nov. 8, 1945, six days after the last of the batch, VB889, was completed. PP164 mentioned by Mr. Powell had then already gone into service as early as February of that year.

Although Short Bros. and Harland's contracts were cut, and 12 Sunderlands ordered as SZ600-611 were cancelled, production continued at Belfast until Jne. 14, 1946, when SZ599, the last Sunderland built, left the works. This was a Mk. V—or G.R.5/M.R.5 as it was successively designated.

London, S.E.4. BRUCE ROBERTSON.

Sunderland Highlights

MR. DENNIS M. POWELL'S letter about the Sunderland in your Jly. 20 issue gave me much pleasure. I was especially pleased that he paid tribute to Mr. Peter Thomas for it was almost entirely due to his enthusiasm and energy that one of these fine aircraft has been preserved.

As Mr. Powell indicates Sunderlands were much in demand when war came. At that time the only source of supply was Rochester and they were made and test flown there under, at times, considerable difficulty. The Battle of Britain, day and night bombing raids, mines in the river and the nasty V1s and V2s. At the height of the V1 attack defence balloons were moored in considerable numbers along the banks of the Medway. In a westerly wind this meant taking-off and landing under the wires.

Mr. Powell is not quite accurate when he says Sunderlands were sometimes flown away by the R.A.F. and the R.A.A.F. without even a local test flight. So far as I know, and I should, no Sunderland or any other Short aircraft was handed over to the Services until it had been test flown by a Short pilot. Admittedly the test was sometimes extremely brief.

It was quite remarkable that the Seaplane Works was not damaged during the first two years of the War but it did ultimately suffer a direct hit. A big one landed on the office end and completely wrecked the design offices and about a third of the works. Fortunately the attack took place at night and only one man was killed. The way the mess was cleared up and production restored in a matter of days was one of the finest, and least advertised, efforts I have come across.

Thank you, Mr. Powell, for reviving interesting and (usually) pleasant memories.

Worlington. JOHN LANKESTER PARKER.

Groundabout

Chez Gatwick. A reader living near London (Gatwick) Airport says some hard things about that "grey elephant," the name he gives it because of its being as frequently fog-bound as London (Heathrow) Airport, for which Gatwick is supposed to be an unfoggy alternate. And, he says, "weren't B.E.A. supposed to be moving to this relatively minor charter base?" The best thing about it, he adds, is its good but expensive restaurant, but, alas, today's heavy taxation (including contributing towards Gatwick) renders him unable to afford to eat there. Well, that's aviation—nothing's ever quite perfect.

*

Widow In Every Port. During an evening rush at Heathrow, B.E.A. received a call from Naval Police H.Q. asking if a certain seaman had arrived from Malta and if B.E.A. could supply his U.K. address. When told that neither addresses nor passenger lists were kept, the caller was amazed—"But don't you always have somebody standing by the aircraft steps on embarkation, asking passengers for the name and address of next of kin?"

*

Udder Temps Udder Mœers*. According to an advertisement in the *Hertfordshire Mercury*, "The de Havilland Aircraft Co., Ltd., require a COWMAN for their herd of pedigree British Friesians." I suppose the company regard their ranch as a useful standby in these changing times but a more logical need would seem to be for a Drover for their herd of pedigree Caribou.

**French, of a kind, for "Things ain't what they used to be."*

*

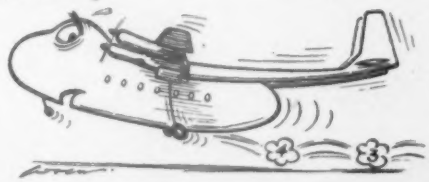
Must be *right*, too. A caption in United Aircraft Corporation's *Bee-Hive* says: "Cutting threads for screws calls for high accuracy and exactness."

*

Accountants Are In Charge. The United Dominions concern will back almost anything that's promising—record flight attempts, aircraft purchasing, and even supplying Stirling Moss with a race-winning "United Dominions Lotus Mk. 19" racing car, as they did in Canada. In view of the complex financing arrangements to help airlines buy airliners, can we expect in the future such slogans as "Prudential takes you there and brings you back" or the claim that Sun Life has completed 10,000 Atlantic crossings?

*

Riddle. "Six Argosies used by A.W.A. on development flying logged 2,280 hours in 1,434 flights involving 1,941 landings.—**Hawker Siddeley Aviation Press Release.** Or was it 1,941 flights involving 1,434 landings?



by Gren

Aviation News in General

MORE GNATS.—A "further substantial number" of Gnat Trainer T.1s has been ordered for the R.A.F. from Folland Aircraft. An order for a development batch of 14 was placed in March, 1958, and a contract for 30 more was placed a year ago. The Gnat Trainer is due to enter service next spring and in time will replace the Vampire T.11 as the R.A.F.'s standard advanced trainer.

ATLANTIC PROGRESS.—The prototype Breguet 1150 Atlantic has now been completed and is undergoing vibration tests. Its first flight is scheduled for the second half of October. The second prototype will be completed in November. Series production is to begin next year. France has 27 on order and Germany 20.

RECORDS CONFIRMED. — The F.A.I. has confirmed the London-Valletta, Malta, record set up by two Hunter FGA.9s on Apr. 25 (see p. 475 of our May 4 issue) and also a new 500-km. closed circuit record for aircraft of more than 3,000 kg. established by an An-10 on Apr. 29 (see page 575 of our May 25 issue).

FUELLING SERVICE. — Shell-Mex and B.P. will again be providing a fuelling service for private aircraft using R.A.F. Odiham between Sept. 4 and 8 in connection with the Farnborough Show.

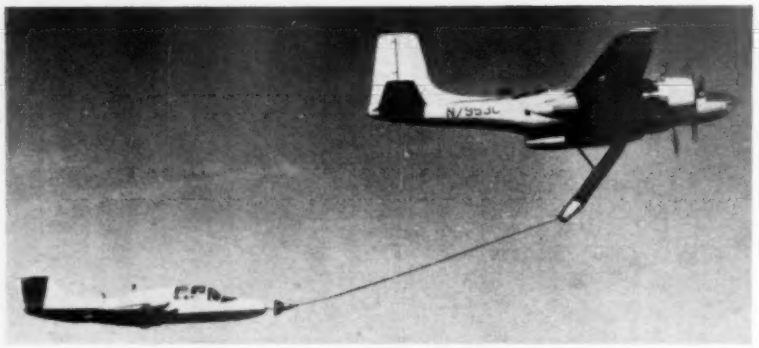
CANADIAN VOODOOS.—The first of 66 F-101B Voodoos purchased for the R.C.A.F. was handed over to No. 412 Squadron based at Uplands, Ont., on Jly. 24.

CRUSADER VARIANT. — A new version of the Chance Vought Crusader all-weather fighter is now being flight tested after making its first flight at Dallas on Jne. 30. Designated F8U-2NE, it has a larger and higher-performance radar than the F8U-2N.

MIGHTY MIDGET.—Another recent first flight in America was that of the Douglas A4D-5, latest version of the Skyhawk light attack bomber. A P. & W. J52 turbojet replaces the Wright J65 which powered earlier versions.

Tu-114 RECORD.— A Tupolev Tu-114 recently set three new records (subject to confirmation) by flying to 41,125 ft. with a payload of 30,035 kg. (66,216 lb.). This is a record for altitude with 20, 25 and 30 tonnes.

TRANSATLANTIC SABRELINER—Completing a European sales tour, the North American T-39 Sabreliner demonstrated at the Paris Show flew from Madrid to New York on Jly. 17 in an elapsed time of 9 hr. 39 min., claimed as an unofficial long-distance speed record for aircraft in its class. A mix-up at Idlewild prevented certification of its arrival for an official record. Stops en route were made in the Azores and Newfoundland, the 3,873-mile crossing being made at an average speed of 413 m.p.h.



QUICK FILL-UP.—Contact is made between a B-26 tanker and a Morane-Saulnier Paris during feasibility tests of an air refuelling system developed by Beech Aircraft for the U.S. Navy. The 16-ft. aluminium pod which houses the system is designed for quick attachment and jettison from the tanker.

HELP WITH THE FRELON.—Sikorsky is to provide design, test and construction assistance for Sud Aviation's S.E.3120 military helicopter, two prototypes of which are to be built. Sikorsky will be primarily concerned with the main and tail rotor systems.

B-52H BASE.—SAC's 4136th Strategic Wing at Minot A.F.B., North Dakota, has become the second to receive the B-52H. By August, 1962, six SAC bases will have their full complement of these aircraft.

THOR BOOST.—Douglas are said to be still pressing their proposal for adding solid rocket boosters to Thor, thereby increasing its space payload capability. Thorad Jr., for example, would have three Thiokol-developed Little Joe boost rockets symetrically disposed around the IRBM's base giving a total initial thrust of 315,000 lb. Flight testing could begin in one year, according to Douglas.

WEIGHTLIFTER.—Latest conception of the Sikorsky S-64 Skycrane in which both the U.S. and West German military are interested. First flight is scheduled for early 1962.

GULFSTREAM DELIVERED.—The Gulfstream ordered for executive use by the Nigerian Government was handed over on Jly. 28 at Cambridge by G.o.M. Air Interest, the European agents.

GHANA'S AIR FORCE.—Ghana is reported to be spending £14 million during the next four years on building up its air force. Types purchased to date are the Whirlwind 10, Heron, Caribou, Chipmunk, Beaver and Otter. Thirty R.C.A.F. officers are to be seconded to the Ghana Air Force.

SUPER-POLARIS. — An advanced model Polaris was launched from Cape Canaveral on Jly. 14 on a planned flight of 1,600 miles. A similar missile was launched from U.S.S. "Observation Island" on Jne. 27 but missed its target "by scores of miles."

SPACE BANG. — A Discoverer satellite launched from Vandenberg A.F.B., Calif., on Jly. 21, was destroyed by the range safety officer after some 60 seconds. It carried a 300-lb. re-entry capsule.

AUSSIE "ANTI."—It is reported that the United States is to participate with Australia in the development of a guided missile system for the delivery of the Mk. 44 anti-submarine torpedo to be known as Project Ikara.

LONG SHOT.—The U.S. Army fired a two-stage Pershing missile from Cape Canaveral on Jly. 19 over a distance of about 250 miles. It was the missile's 16th success in 19 launchings.

GOOD STOL.—Since its first flight on Jne. 1 the prototype Breguet 941 has accumulated some 10 hours' flying time. Its STOL performance, say the makers, has come up to expectations.

SPOT ON.—The "near-circular" orbit achieved by Midas III, originally stated to have an apogee of 1,850 miles, is now revealed to be 2,129 miles (perigee), 2,153 miles (apogee); period 161.5 min. Thus the orbit is *more circular* than the Earth. The orbital inclination is 91.2°.

SPACE RECORDS.—The F.A.I. has accepted the performances of Major Yuri Gagarin and Cdr. Alan B. Shepard as World Records. These are: Vostok, duration in Earth orbital flight, 108 min.; greatest altitude in Earth orbital flight, 327 km.; greatest mass lifted in Earth orbital flight to a maximum altitude of 327 km., 4,725 kg. Mercury (Freedom 7), altitude without Earth orbit, 186,307 metres; greatest mass lifted without Earth orbit, 1,832.61 kg.

COMPANY SATELLITE.—The A.T. and T. Co. have won approval for their scheme to develop commercial communication satellites (THE AEROPLANE AND ASTRONAUTICS, Jan. 13, 1961, pp. 44-45). NASA has announced that it will launch two to four of the company-built satellites in 1962, using Thor-Agenas; A.T. and T. will reimburse the agency for launching and tracking costs.

Commercial Aviation Affairs

CL-44 IN SERVICE.—The first scheduled all-cargo service by Seaboard World Airlines with the Canadair swing-tail CL-44 was operated on Jly. 24-25 between Frankfurt and New York International. Seaboard has five on order.

HERON FOR THE QUEEN.—A fourth D.H. Heron has been added to the Queen's Flight. The three already in use—the first was delivered in January, 1955, and two more were added in April, 1958—have between them flown more than a million miles to date.

CARAVELLE ORDER.—Another Caravelle has been ordered by S.A.S., bringing the total purchased to 23, including eight for Swissair. With the two recently ordered by Sabena, 119 Caravelles have now been sold.

CHEAP FARES.—T.W.A., American and United have asked the C.A.B. to approve 13-30-day excursion fares on transcontinental U.S. routes from mid-August to mid-December, at savings of about one-third of the existing coach fares. The fares (about £65 for the return trip) would apply from Monday noon to Friday noon.

THREE MORE DC-8s.—Delta Airlines has ordered three turbofan DC-8 Series 50s for delivery in April, May and July next year. The total number of announced DC-8 sales is now 170, of which 23 are turbofan-powered.

MOSCOW-U.S.A.—The Soviet delegation which, led by Col.-Gen. E. F. Loginov, head of the U.S.S.R. Central Administration of the Civil Air Fleet (Aeroflot), has been discussing direct U.S.S.R.-U.S.A. air services (see last week's issue, p. 96), flew over in a Tu-114 which made the non-stop journey from Moscow to Andrews A.F.B. in 11 hr. 15 min. on Jly. 17.

N.Y.A's 107.—The first of five twin-turbine 25-passenger Boeing-Vertol 107s for New York Airways seen during its initial flight on Jly. 24. It is powered by General Electric T-58s. The 107s will replace the five piston-engined Vertol 44s which have been operated by N.Y.A. since 1958.

T.W.A. 720Bs.—The first Boeing 720B turbofan for Trans World Airlines (on lease) was delivered to Kansas City on Jly. 23. It will be used for crew training, with service-entry later this month. T.W.A. has ordered 30 720Bs, 26 of which are being purchased and four leased.

FARES UNCHANGED.—Channel Air Bridge (a non-IATA carrier) will make no change in its vehicle-ferry fares when European fares in general rise on November 1. The company hopes to reduce fares when the Carvairs come into service next year.

BASLE SERVICE.—Dan-Air's new service from Bristol, Cardiff and Swansea, which opened on Jly. 8, has made it possible for West Country travel agents to offer inclusive tours for Swiss and Italian resorts without the complication of travelling through London. The popularity of the service may lead the company to continue it throughout the year.

ELECTRA HI-JACKED.—An Eastern Air Lines Electra on a flight from Miami to Tampa, Florida, was forced to fly to Havana on Jly. 24, when a Cuban threatened the captain with a revolver. Passengers and crew were later returned to the U.S., but the aircraft is being held in Cuba. A number of Cuban airliners have been impounded in the U.S. over the past few months at the instigation of companies seeking to recover losses in Cuba.

707 ACCIDENT.—On Jly. 27 an Air France Boeing 707-328 on the Tokyo run crashed during take-off at Hamburg. Only nine of the 43 occupants were slightly injured, but the aircraft was seriously damaged after running into a construction site.

News About People

H.S.A. OVERSEAS.—With the retirement of Mr. J. A. Kerr, managing director of the de Havilland Aircraft Co. of New Zealand, Ltd., changes have been made in the management of this company and also of Hawker de Havilland (Pty.), Ltd., South Africa. Mr. Kerr is to be succeeded by Mr. J. Lorentz, formerly general manager of the South African company. Mr. Lorentz has handed over the general management of Hawker de Havilland (Pty.), Ltd., to Air Vice Marshal E. W. S. Jacklin, formerly C.A.S. and A.O.C. of the Royal Rhodesian Air Force.

BALPA GOLD MEDAL.—The British Air Line Pilots Association's Gold Medal for "outstanding services to the pilot profession" has been awarded to Capt. P. E. Bressey and will be presented at the Association's annual cocktail party in December. Capt. Bressey has been in aviation for 30 years, starting with Imperial Airways, and the award expresses the Association's appreciation of his outstanding contribution to the technical work of BALPA—and of IFALPA, which he has represented at 17 ICAO meetings.

COMPANY SECRETARY.—Mr. T. P. Rutter has become company secretary of Bristol Aerojet, Ltd., succeeding Mr. G. Hanby, who has taken up an appointment with Bristol Aircraft, Ltd.

GHANA APPOINTMENT.—Mr. F. G. Porter-Miles has been appointed deputy general manager of Ghana Airways. Mr. Porter-Miles joined B.E.A. in 1946 and has been with B.O.A.C. since 1952. He has been seconded to Ghana Airways from B.O.A.C. Southern Routes.

B.U.A. APPOINTMENT.—Mr. G. G. "George" Carroll has been appointed general commercial manager of British United Airways. He was previously personal assistant to the executive director, and joined Airwork, Ltd., as an accountant in 1947.

MR. WALTER HILL.—We regret to record the death, on Jne. 3, of Mr. Walter Hill, O.B.E., for many years manager of the Shell International Petroleum Co.'s aviation division in London. From 1924 until 1955, when he retired after 37 years with the Royal Dutch/Shell Group, he played a major part in the promotion of a World-wide airfield fuelling service. He was also responsible for the wartime creation of Shell's Aero-Engine Research Laboratory at Thornton, Cheshire, which was initially operated in conjunction with the M.A.P.

Industry Record

Positively Identifiable Hose

At the request of the R.A.E., Maricon, Ltd., has developed complete assemblies incorporating its Type H hose in order to facilitate the positive identification of pipe system connections. Manufactured with both an age- and weather-resistant Neoprene cover, this type of flexible tubing has a fabric braid insert to reduce kinking tendencies. The inner lining of the hose is of colourless natural rubber, since this type of tubing can also be used for breathing apparatus.

End fittings are of the type that cannot be used more than once and are swaged onto the hose so that they cannot be removed and the wrong size inadvertently refitted. End fittings for pitot systems—Maricon type H hose is widely used for pitot and static instrument systems—are of a different size from those used for static systems so that the hose cannot be cross-fitted. The end fittings, complete with patent nuts in light alloy, are supplied to Maricon by Drallim Industries, Ltd. The systems can be prepared in lengths as specified by individual aircraft manufacturers' requirements.

Counting the Hours

Time Totalizer is the name given to a small new elapsed-time indicator produced by the Leland Airborne Products division of AMF, Ltd. This has been designed to record the hours of operation of both airborne and ground electronic gear but it lends itself to use by any industry concerned with the maintenance of machinery or devices which require metering of time-in-use.

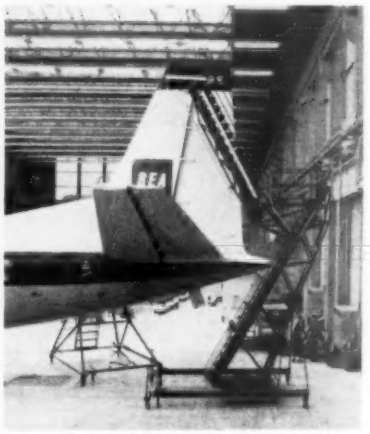
Functionally the unit is a mercury coulometer, operated by an integral electrical network which compensates for temperature differences and for supply voltage variations. Two basic models are available for either AC or DC operations. At present both are designed for full scale ranges of 1,000 hr. Major advantages claimed for the Time Totalizer are great resistance to error from vibration or shock, its wide temperature ranges and low cost.

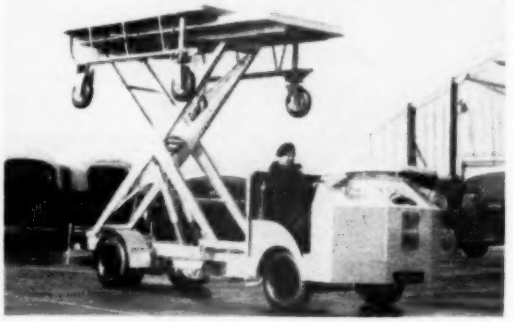
Safeguarding Electronics Interest

The Council of the British Electrical and Allied Manufacturers' Association has established an electronics board to represent that part of the Association's membership directly concerned with electronics engineering. This new board will act for the B.E.A.M.A. council on matters of broad policy in this field and will provide the necessary high-level liaison with Government departments and other Associations on policy matters affecting the electronics industry.

Initial members of the board are: Mr. L. Bagrit (Elliott Bros.), chairman; Mr. O. W. Humphreys (G.E.C.), vice-chairman; Mr. E. B. Banks (English Electric); Mr. W. S. Steel (A.E.I.); Mr. Sebastian de Ferranti (Ferranti); and Mr. C. Metcalfe (E.M.I.). The chairman of the B.E.A.M.A. industrial electronic equipment section, at present Mr. W. Gregson (Ferranti), is also a member of the board.

These arrangements, say the Association, are designed to provide within the framework of the B.E.A.M.A. an organization to safeguard the interests of British manufacturers concerned with electronics engineering, but it is not intended to assume, on behalf of Association members, responsibility for other sectors of the electronics engineering industry—for example, telecommunications and components which are already dealt with by existing associations. The board will, however, co-operate with the governing bodies of such other associations whenever policy matters affecting the electronics industry as a whole call for representations at top level.





Two items from the range of airport equipment produced by the Mercury Truck and Tractor Co., Ltd. Above, access to the fin of a B.E.A. Vanguard is gained by the multi-level maintenance platform adjustable from 7 ft. 6 in. to 40 ft. Left, the low/high loader (seen with pallet trailer) has a height range of 3 ft. 6 in. to 11 ft. and a carrying capacity of 6,000 lb.

Electrics Brochure

A comprehensive 28-page illustrated guide to the aircraft electrical equipment now being produced by the Plessey Group has just been published. After describing the Group's research facilities, the brochure goes on to illustrate the wide range of items that are in production—varying from specially developed electrical connectors, impervious to the effects of kerosene-based fuels, to servo equipment and complete aircraft generating systems.

Manufacturers and design establishments can obtain copies of the publication, No. 388, from The Aircraft Electrical Division, The Plessey Co., Ltd., Ilford, Essex.

Developments from Dundee

Two new high-voltage vacuum ceramic envelope rectifiers from the Dundee factory of Ferranti, Ltd., are the UR.41 and an experimental model, the DXV 18432. Both these valves have indirectly heated cathodes, which are substantially metallic, and combine the features of conventional oxide-coated cathodes, which are economical in heating power, with those of thoriated tungsten cathodes, which are able to withstand high voltages.

The UR.41 was developed primarily for use as an inverse diode in radar modulators whenever conditions of "extreme environment" or high peak inverse voltages prevent the use of conventional glass valves. Rated at 16 kV. P.I.V., it can withstand a surge voltage of up to 20 kV. and will operate successfully at high ambient temperatures with a limiting anode temperature of 225° C. Life claim is 1,000 hr. at this temperature.

Designed for use as an inverse diode in high power radar modulators, the DXV 18432 is rated at 28 kV. P.I.V. and 30A peak pulse anode current.

German Representation

Powell and Co., A.G., of Kapellenstrasse 1, Bad Godesberg, are to act as official agents in Western Germany for H. M. Hobson, Ltd., and its associate company Integral, Ltd.

Aviation Calendar

Aug. 12

Doncaster.—Doncaster and District Gliding Club Open Day.

Aug. 16

Cambridge, Mass.—American Rocket Society and Air Force Office of Scientific Research International Hypersonics Conference; until Aug. 18.

Aug. 29

Luton.—International Light Aircraft Exhibition; until Sept. 2.

Sept. 3

Wolverhampton.—Wolverhampton Aero Club At Home.

Sept. 4

Farnborough.—S.B.A.C. Exhibition and Flying Display; until Sept. 10. (Public days Sept. 8-10.)

Company Notices

NEW COMPANIES

Instrument Panel Services, Ltd. (698,041).—Private co. Reg. Jly. 12. Cap. £1,000 in £1 shs. To carry on the business of manufacturers and installers of and dealers in instrument panels and associated equipment. Directors: Herbert R. Beasley and Kathleen M. Beasley, both of 39 The Street, Ashstead, Surrey; Terence A. Marriott, 27 Cox Lane, West Ewell. Sec.: T. A. Marriott. Sols.: Masons, W.C.2. Reg. off.: 61 Carey Street, W.C.2.

Skyfreight, Ltd. (697,836).—Private co. Reg. Jly. 10. Cap. £100 in £1 shs. To carry on the business of operators of air lines. Directors: William J. Hills, 57 Roundmead Avenue, Loughton, Essex; Victor N. Sterens, 36 Mayfair Gardens, Woodford Green, Essex. Sec.: G. Tinwell. Reg. off.: 35-37 Central Parade, Hoe Street, E.17.

W. H. Walker (Engineers), Ltd. (698,060).—Private co. Reg. Jly. 12. Cap. £1,000 in £1 shs. To carry on the business of aircraft and general engineers. Directors: William H. Walker (chairman), 13 Kershaw Drive, Chadderton, Oldham; Kenneth C. Walker, "Cranford," Mottram New Road, Hyde, Ches. Sec.: K. C. Walker. Reg. off.: Greenbank Mills, Greengate Street, Oldham.

Webbers Aviation Services, Ltd. (697,786).—Private co. Reg. Jly. 10. Cap. £100 in £1 shs. To acquire, sell, import, export, build, hire and charter aircraft, helicopters. Directors: Frank A. Webber, 1 Lancaster Lodge, Lancaster Road, W.11; Pamela Webber, Chesham Street, S.W.1. Sec.: Frank A. Webber. Reg. off.: 31 Kensington Church Street, W.8.

New Patents

APPLICATIONS ACCEPTED

876,583.—**Soc. Nationale d'Etude et de Construction de Moteurs d'Aviation.**—"Adjustable jet propulsion nozzle and jet propulsion engine provided with such nozzle." Nov. 6, 1959. (Nov. 12, 1958.)

876,613.—**Firth Cleveland, Ltd.**—"Machines for inducing flow of fluid, for example, fans and propellers." Jly. 2, 1957. (Jly. 7, 1956 and Dec. 7, 1956.) Divided out of 876,611.

Printed specifications of the above will be available on Sept. 6, 1961, and the opposition period will expire on Dec. 6, 1961.

Personal Notices

BIRTHS

Allen.—On Jly. 13, at R.A.F. Hospital Changi, Singapore, to Joanna, wife of Wg. Cdr. R. A. E. Allen—a daughter.

Batten.—On Jly. 16, at Barnstaple, to Kathy, wife of Flt. Lt. G. Batten—a son.

Beatson.—On Jly. 15, at R.A.F. Hospital Ely, to Julia, wife of Sqn. Ldr. T. R. Beatson—a daughter.

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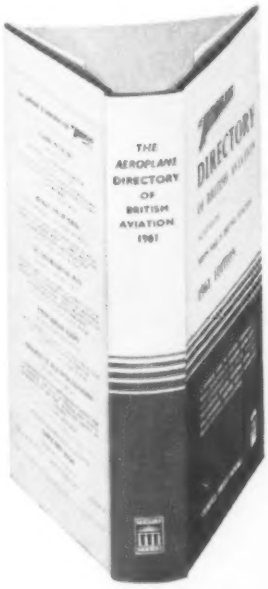

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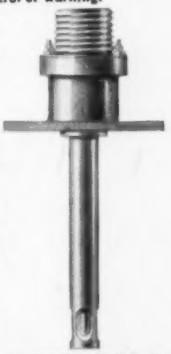

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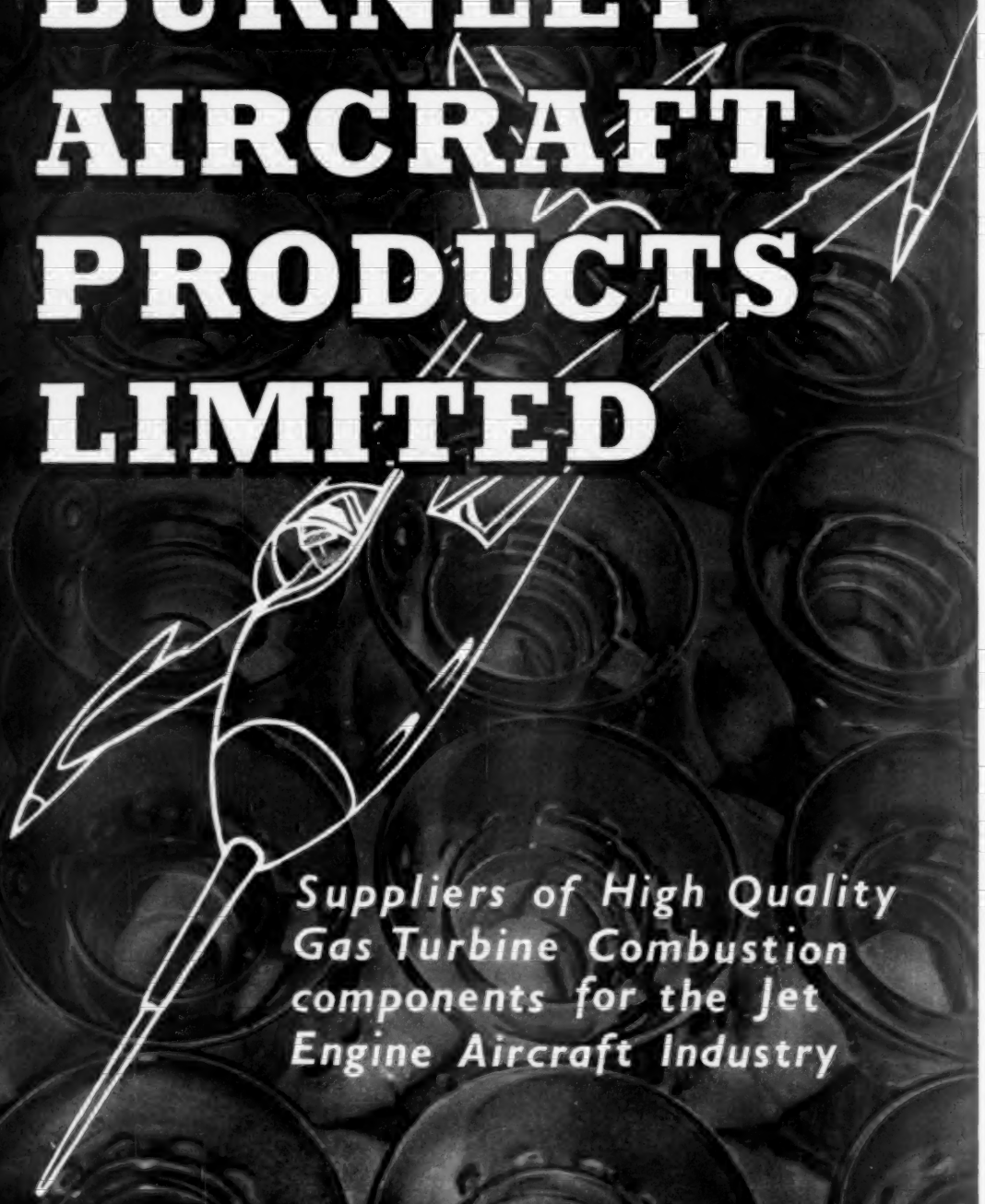

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